U.S Department
of Transportation

**Federal Aviation
Administration**

Western-Pacific Region
Airports District Office

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March 31, 2023

Mr. Edwin H. Sniffen
Director of Transportation
State of Hawaii Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Dear Mr. Sniffen:

Lihue Airport
Acceptance of Noise Exposure Maps

This letter is to notify you that the Federal Aviation Administration (FAA) has evaluated and accepted the Noise Exposure Maps dated February 2023 and supporting documentation for the Lihue Airport. In accordance with Section 103(a)(1) of the Aviation Safety and Noise Abatement Act of 1979 (the Act), as amended, we have determined that:

1. Exhibit NEM-1, The 2019 Existing Condition Noise Exposure Map noise contours and supporting documentation meet the requirements for the current Noise Exposure Map as of the date of submission as set forth in Title 14, Code of Federal Regulations (CFR), Part 150, *Airport Noise Compatibility Planning*, Section 150.21, and are accordingly accepted under this Part.

2. The projected 2027 aircraft operations, Exhibit NEM-2, the 2027 (Forecast) Noise Expsoure Map noise contours and supporting documentation are accepted as the description of the future conditions as set forth in Part 150, and are accordingly accepted under this Part.

FAA's acceptance of the Noise Exposure Maps is limited to the determination that the maps were developed in accordance with the procedures contained in Appendix A of Part 150. Such acceptance does not constitute approval of your data, information, or plans.

The FAA will publish a notice in the *Federal Register* announcing the acceptance of the Noise Exposure Maps for Lihue Airport. The FAA's acceptance of these Noise Exposure Maps under Part 150 in no way approves or endorses a Noise Compatibility Program, potential related federal funding of projects identified in such a program, or any related operating restrictions at the subject airport.

Should any questions arise concerning the precise relationship of specific properties to Noise Exposure Contours depicted on the Noise Exposure Maps Update, you should note that the FAA will not be involved in any way in the determination of relative locations of specific properties with regard to the depicted noise contours, or in interpreting the maps to resolve questions concerning, for example, which properties should be covered by the provision of Section 107 of the Act. These functions are inseparable from the ultimate land use control and planning responsibilities of local government. These local responsibilities are not changed in any way under Part 150 or through FAA's acceptance of your Noise Exposure Maps Update. Therefore, the responsibility for the detailed overlaying of noise contours onto the maps depicting properties on the surface rests exclusively with you the airport operator, or those public agencies and planning agencies with which consultation is required under Section 103 of the Act. The FAA relies on the certification by you under 150.21 of 14 CFR Part 150, that the statutorily required consultation has been accomplished.

Your notice of this determination, and the availability of the Noise Exposure Maps, which when published at least three (3) times in a newspaper of general circulation in the county where the affected properties are located, will satisfy the requirements of Section 107 of the Act. A sample publication announcement has been enclosed for your use.

Your attention is called to the requirements of Section 150.21 (d) of Part 150, involving the prompt preparation and submission of revisions to these maps, if any actual or proposed change in the operation of the subject airport might create any substantial, new noncompatible land use in any areas depicted on the maps.

Thank you for your continued interest in Noise Compatibility Planning.

Sincerely,

Gordon K. Wong
Manager, Honolulu Airports District Office

Enclosure

cc:
HDOT-A (with enclosure)
APP-400; AWP-610 (without enclosure)

June 2022 (Amended January 2023)

Lihue Airport | Lihue, Kauai, Hawaii

Title 14 Code of Federal Regulations Part 150,
Airport Noise Compatibility Planning

Noise Exposure Map Update

Prepared for:

State of Hawaii, Department of Transportation – Airports Division

JUNE 2022 (AMENDED JANUARY 2023)

Lihue Airport

Title 14 Code of Federal Regulations Part 150, Airport Noise Compatibility Planning

Noise Exposure Map Update

Prepared for:

State of Hawaii, Department of Transportation – Airports Division

Prepared by:

RICONDO

AMENDMENT TO THE NOISE EXPOSURE MAP UPDATE REPORT

The Title 14 Code of Federal Regulations Part 150, Airport Noise Compatibility Planning, Noise Exposure Map (NEM) Update for Lihue Airport (NEM Update Report) was originally submitted to the Federal Aviation Administration (FAA) on June 16, 2022. The FAA has conducted a formal review and provided comments to the NEM Update Report. In response to the FAA's comments, the NEMs have been amended, and the Sponsor's Certification has subsequently been updated. This NEM Update Report includes updated content in response to FAA's formal review comments. **Appendix F** includes the FAA's formal review comments and responses to those comments.

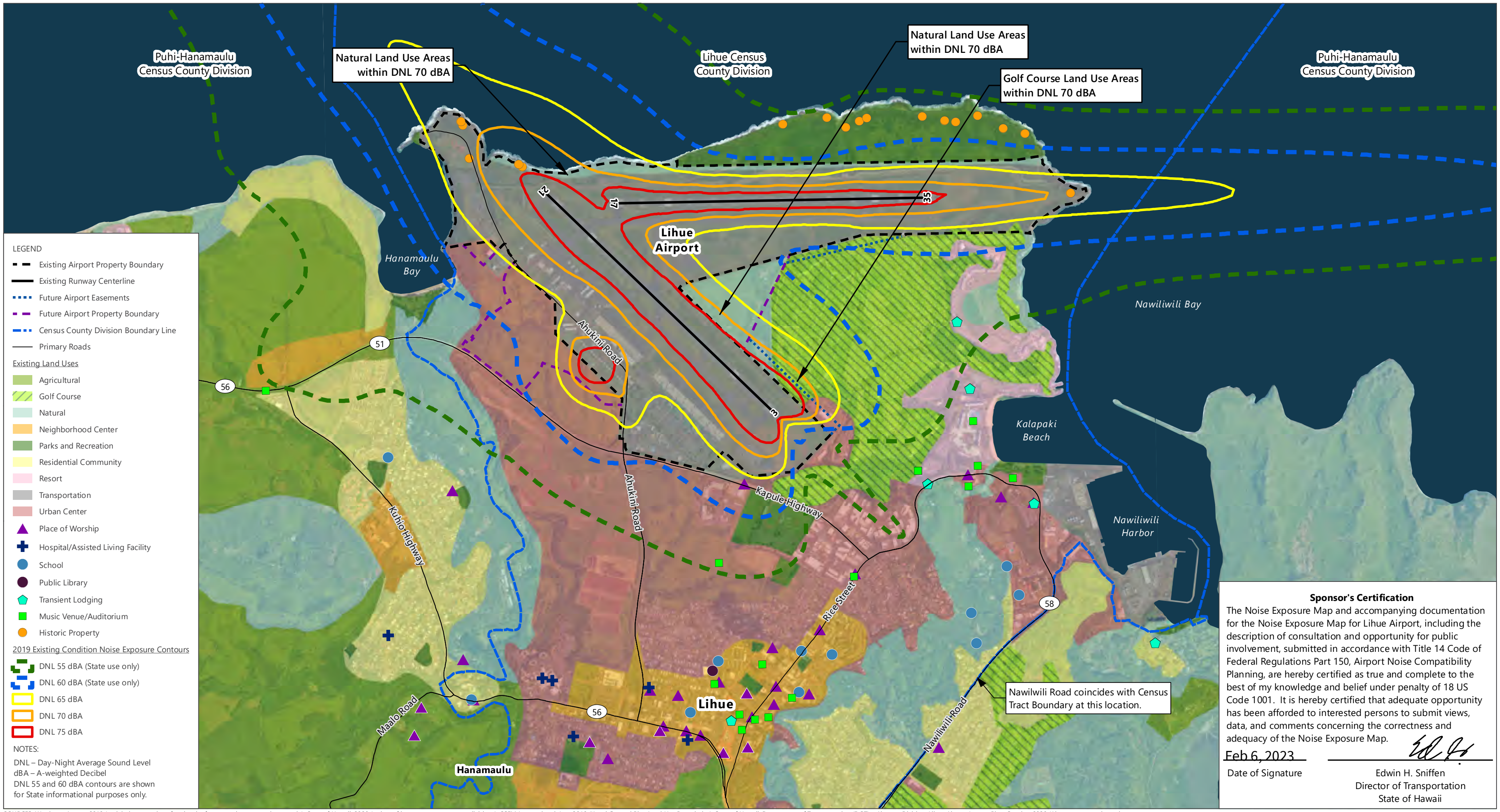
SPONSOR'S CERTIFICATION

The Noise Exposure Maps and accompanying documentation for the Noise Exposure Maps for Lihue Airport, including the description of consultation and opportunity for public involvement, submitted in accordance with Title 14 Code of Federal Regulations Part 150, *Airport Noise Compatibility Planning*, are hereby certified as true and complete to the best of my knowledge and belief under penalty of 18 US Code 1001. It is hereby certified that adequate opportunity has been afforded to interested persons to submit views, data, and comments concerning the correctness and adequacy of the Noise Exposure Maps and descriptions of forecast aircraft operations.

Feb 6, 2023

Edwin H. Sniffen
Director of Transportation
State of Hawaii

Date



SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., based on Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT), Version 3d, November 2021 (noise contours).

NORTH

0 2,000 ft

EXHIBIT NEM-1

2019 EXISTING CONDITION NOISE EXPOSURE MAP

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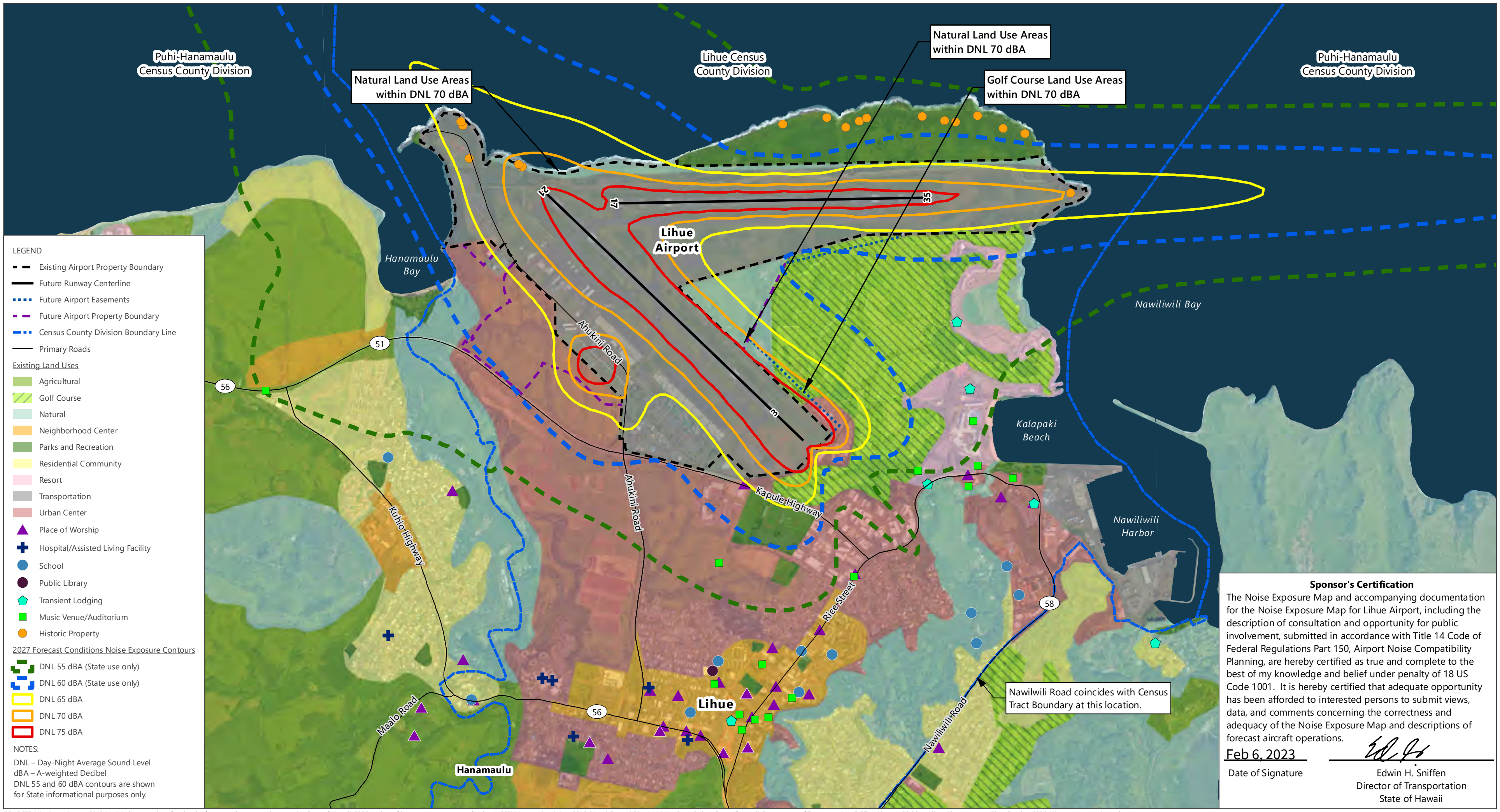

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The Noise Exposure Map and accompanying documentation for the Noise Exposure Map for Lihue Airport, including the description of consultation and opportunity for public involvement, submitted in accordance with Title 14 Code of Federal Regulations Part 150, Airport Noise Compatibility Planning, are hereby certified as true and complete to the best of my knowledge and belief under penalty of 18 US Code 1001. It is hereby certified that adequate opportunity has been afforded to interested persons to submit views, data, and comments concerning the correctness and adequacy of the Noise Exposure Map and descriptions of forecast aircraft operations.

Feb 6, 2023

Date of Signature

Edwin H. Sniffen
Director of Transportation
State of Hawaii

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., based on Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT), Version 3d, November 2021 (noise contours).

NORTH 0 2,000 ft

EXHIBIT NEM-2

2027 FORECAST CONDITIONS
NOISE EXPOSURE MAP

P:\GIS\Projects\LIH\MXD\LIH_NEM_NEM-2_Forecast2027ConditionsNoiseExposureMap_20221107.mxd

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1. INTRODUCTION

This report documents the methodology, data, and results used to prepare the Title 14 Code of Federal Regulations (CFR) Part 150, *Airport Noise Compatibility Planning*, Noise Exposure Map (NEM) Update study (Part 150 NEM Update study or the Study) for Lihue Airport (LIH or the Airport). The update process requires a reasonable representation of the existing condition and forecast conditions; the forecast year should be at least five years from the date of submittal of the NEMs to the FAA.[1]

The impacts of the Coronavirus Disease 2019 (COVID-19) pandemic affected operations in 2020 and 2021. The Study timeline was also affected as traveling and face-to-face meetings were significantly reduced. The Study was submitted to the FAA in 2022, with forecast conditions for 2027 and using the year 2019 to represent the existing conditions. Section 1.3.1.1 further explains the use of 2019, rather than 2021 or 2022, to represent existing conditions.

1.1 TITLE 14 CODE OF FEDERAL REGULATIONS PART 150

14 CFR Part 150 sets forth the regulations and guidelines for airport sponsors to undertake airport noise compatibility planning. The 14 CFR Part 150 regulations were promulgated by the FAA pursuant to the Aviation Safety and Noise Abatement Act of 1979 (ASNA), Public Law 96-193, which required the establishment of a single methodology for measuring aircraft noise (noise), determining noise exposure, and identifying land uses that are normally compatible with various levels of noise exposure. Under ASNA, airport operators can voluntarily submit NEMs and noise compatibility programs (NCPs) to the FAA for review and acceptance. The two required NEMs provide information on the existing and forecast areas of various levels of annual average noise exposure surrounding an airport. The NCP provides measures intended to mitigate the impacts of the significant noise exposure on residential areas near an airport and to restrict the introduction of new incompatible land uses into locations exposed to significant noise levels.

Through 14 CFR Part 150, the FAA established regulations to govern the technical aspects of aircraft noise analysis and the public participation process for airport sponsors to prepare airport NCPs. As previously noted, the 14 CFR Part 150 program is a voluntary program; it provides flexibility for an airport sponsor to choose to prepare an NEM only. This is often done in cases such as LIH, where complete 14 CFR Part 150 studies, including an NCP, have been developed in the past.

1.2 BACKGROUND

The State of Hawaii, Department of Transportation – Airports Division (DOT-A) completed the last 14 CFR Part 150 NEM and NCP Study for LIH in 1989. The FAA accepted the NEMs in May 1990 and approved the NCP in January 1992. DOT-A decided to update the NEMs to reflect current and forecast operations, changes in the aircraft used by operators, and changes to the airfield, such as the runway safety area (RSA) improvements described in the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final Environmental Assessment* (EA).[2]

[1] 14 CFR 150.21.

[2] US Department of Transportation, Federal; Aviation Administration, *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final Environmental Assessment*, March 2018.

1.3 STUDY APPROACH

This section describes the approach to developing the updated NEMs for LIH. The NEM component of a 14 CFR Part 150 study presents aircraft noise exposure contours (contours) that provide a reasonable representation of the existing condition and forecast conditions at least five years from the date of submittal of the NEMs to the FAA. A noise contour is a line on a map that represents equal levels of noise exposure. The methodology, noise metric, and land use data applied to develop the NEMs are described in the following subsections.

1.3.1 METHODOLOGY

14 CFR Part 150 requires the use of standard methodologies and metrics for analyzing and describing noise. The standard methodology begins with the noise model. The FAA requires that NEMs are developed using an approved noise model. The noise levels computed for the Study were prepared using Version 3d of the FAA's Aviation Environmental Design Tool (AEDT), which is the FAA-approved model for determining aircraft noise exposure around airports. At the time the Study started, AEDT Version 3d was the most current. The AEDT was developed under the guidance of the FAA and is the only model generally approved by the FAA for use in 14 CFR Part 150 studies. The noise pattern calculated by the AEDT for an airport is a function of several factors, including the definition of the airfield (runways/helipads), the number of aircraft operations during the period evaluated (operations), the types of aircraft flown (fleet mix), the time of day when aircraft are flown, the way aircraft are flown (performance), the frequency of runway landing and takeoff (runway use), and the routes followed to and from the runways (noise model tracks). Substantial variations in any one of these factors, when extended over a long period of time, may cause marked changes to the noise pattern. The following subsections summarize the data used to develop the NEMs.

1.3.1.1 EXISTING CONDITION

The first step is to develop the NEM that depicts existing noise exposure and land uses in the vicinity of an airport. The data collection and preliminary analysis for the Study were initiated in mid-2020, using data for the previous calendar year—2019. Since the most recently complete calendar year at the time the Study started was 2019, the data-gathering effort focused on 2019.

Following the onset of the COVID-19 pandemic in March 2020, operations decreased substantially at LIH. The decrease in operations is assumed to be temporary, similar to the sudden declines in aviation activity caused by prior shocks to the economy and aviation industry, such as the September 11, 2001 terrorist attacks. The post–COVID-19 pandemic growth in operations is expected to occur at a higher rate than normal over the short-term as the aviation system recovers. The 2020 FAA Terminal Area Forecast (TAF)[3] released in May 2021 focuses on the forecast recovery from the COVID-19 pandemic. The FAA forecast a 13 percent compound annual growth rate (CAGR)[4] between 2020 and 2025 at LIH, a high growth rate compared to typical historical growth rates. The 2021 TAF released by the FAA in March 2022 indicates a similar high short-term growth rate at LIH as the aviation system recovers to 2019 levels between 2021 and 2024. Based on the FAA's TAF, recovery is expected to occur within the next four years.

Due to the temporary nature of the effects from the COVID-19 pandemic and the potential for substantial growth to pre–COVID-19 pandemic levels between 2021 and 2025, it was determined that 2019, rather than 2021 or 2022, remains a reasonable representation of the existing condition for the NEM Update land use compatibility analysis.

[3] US Department of Transportation, Federal Aviation Administration, *2020 Terminal Area Forecast*, May 2021.

[4] The CAGR represents the annual growth rate experienced over a specified period of time.

This approach of applying a different year to represent the existing condition has also been applied when short-term conditions, such as a runway closure, occur at an airport during a given year. A runway closure impacts runway usage, flight track use, and potentially operations levels. If a runway closure occurred for a long period of time in a year, then the year is determined not to be a reasonable representation of existing conditions; therefore, a prior year is considered. Use of 2019 data to represent the existing condition follows the same logic. Therefore, DOT-A concluded that 2019 serves as a reasonable representation of the existing condition. A request to consider 2019 as a reasonable representation of existing conditions was sent to the FAA in December 2021. In their response on January 21, 2022, the FAA concurred with the use of 2019 to represent existing conditions for the Part 150 NEM Update study (see **Appendix B.1**).

The following describe the data used for each noise model input:

- **Airfield:** The primary source for the runway dimensions is the current FAA-approved Airport Layout Plan (ALP).[5]
- **Operation counts:** LIH airport traffic control tower (ATCT) counts by user category provided in the FAA's Distributed Operations Network (OPSNET) were used to derive a representative average annual day (AAD) level of operations. The AAD total count was divided by 2 to derive an operation count for arrivals and departures.
- **Time of day:** Air carrier published flight schedules, US Department of Transportation (US DOT) T-100 data, and the FAA's Distributed OPSNET for 2019 were used for scheduled service time-of-day distributions. There were no data related to time-of-day available for unscheduled operations (general aviation, military, and air tour); therefore, the time-of-day distributions reported in the FAA's Distributed OPSNET report for 2019 served as the primary source, with some refinements to helicopter day/night distributions based on the 1989 Lihue Airport 14 CFR Part 150 NEM and NCP and the 2008 Lihue Airport 14 CFR Part 150 NCP Update reports. Consultation with DOT-A and LIH ATCT confirmed the time-of-day distributions for unscheduled operations developed from the listed sources reasonably represent the 2019 existing condition. The data and information were used to develop a day/night proportion by user category to distribute total operations by user category by time of day.
- **Fleet mix:** Air carrier published flight schedules were used to identify commercial aircraft service by aircraft type. The FAA's Traffic Flow Management System Counts (TFMSC) data for 2019 and based aircraft were used to develop a representative AAD fleet mix for unscheduled operations. An internet survey was conducted related to air tour operators to refine the fleet mix for air tour operations, including helicopters. Consultation with DOT-A and LIH ATCT confirmed the unscheduled aircraft-type assumptions reasonably represent the 2019 existing condition. The data was used to develop a fleet mix proportion by user category to distribute total operations by user category by aircraft type.
- **Flight tracks:** Radar track data that would typically be used to develop modeled flight tracks were not available; therefore, the generalized noise model tracks representing routes for fixed-wing and helicopter aircraft were developed based on previous noise model assessments and input from the LIH ATCT.
- **Runway use:** Runway use was based on a wind analysis using National Oceanic and Atmospheric Administration (NOAA) data from January 1, 2009, to December 31, 2018, at LIH and was compared to previous 14 CFR Part 150 assessments and the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final EA* to confirm the wind analysis results were reasonable. Consultation with DOT-A and LIH ATCT confirmed the runway-use assumptions reasonably represent the 2019 existing condition. The Study assumes a continuation of the current informal Preferential Runway Use Program:

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[5] State of Hawaii, Department of Transportation – Airports Division, *Conditional Airport Layout Plan Approval*, October 2020.

  - Runways 3, 17, and 35 are the noise abatement departure runways for large (over 12,500 pounds gross weight) propeller and jet-powered aircraft. Upon departure from these three runways, the noise abatement procedure is to climb and initiate turns toward the ocean (if practicable) following liftoff.
  - Runways 17, 21, and 35 are the noise abatement arrival runways for large (over 12,500 pounds gross weight) propeller and jet-powered aircraft. All noise abatement approaches to these runways are from a seaward direction.
  - Runway 3-21 is the preferred noise abatement runway for local general aviation operations. Military training operations using military aircraft based on Oahu are the primary training operations conducted on Runway 17-35.
- **Aircraft performance:** To model aircraft performance and arrival and departure noise, the AEDT provides standard aircraft performance data. The standard AEDT performance profiles were used. The AEDT accounts for the departure weight of fixed-wing aircraft when modeling performance based on how far the destination is from an airport and the associated fuel required for the trip. The ranges are broken into stage lengths. Departure stage lengths for fixed-wing aircraft departures were assigned based on the great circle distance from LIH to the destination.

Refer to Chapter 2 for more information on the data inputs for the 2019 existing condition AEDT model.

1.3.1.2 FORECAST CONDITIONS

The 2027 Forecast Conditions NEM depicts noise exposure levels anticipated for at least five years from the date the Part 150 NEM Update is submitted to the FAA (forecast conditions) for review, which is 2022. The 2027 Forecast Conditions NEM was developed using forecast aircraft activity at LIH for 2027, as derived from the *Lihue Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts* report (the Master Plan Forecast Report) that was approved by the FAA on September 30, 2020.[6] Comparison to both the 2020 TAF and 2021 TAF indicate that the *Lihue Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecast* operation levels for 2027 are within 10 percent of the FAA TAF. Details of the forecast and FAA approval letter can be found in **Appendix B**. The following describe the data used for the 2027 forecast conditions:

- **Airfield:** The departure end location of Runway 3 and the displaced landing thresholds for Runway 3 and Runway 21 were changed to reflect the runway safety area improvements as presented in the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final EA*. The future dimensions were based on the current FAA-approved ALP depicting future conditions.[7]
- **Operation counts:** Based on the FAA-approved Lihue Airport Master Plan Forecast (Master Plan Forecast), the AAD total count was divided by 2 to derive an operation count for arrivals and departures.
- **Time of day:** Scheduled operations were based on a forecast flight schedule developed for the Lihue Airport Master Plan Update (Master Plan Update) that includes time of day. For unscheduled operations, the 2019 time-of-day distributions were held constant for 2027. The time of day for 2027 scheduled service is different compared to 2019 based on scheduled flight adjustments based on forecast analysis.
- **Fleet mix:** The forecast fleet mix for scheduled operations was developed based on the published airline aircraft orders and forecast aircraft sizes needed to accommodate passenger demand. The unscheduled operations

[6] US Department of Transportation, Federal Aviation Administration, *Aviation Forecast Approval-Lihue Master Plan,* September 30, 2020.

[7] State of Hawaii, Department of Transportation – Airports Division, *Conditional Airport Layout Plan Approval*, October 2020.

fleet mix was based on the 2019 aircraft types. The percentage use of unscheduled operations aircraft types for 2019 was maintained for 2027.

- **Flight tracks:** Changes to the flight tracks are not expected in the forecast year; therefore, definition and use of noise model tracks from the 2019 existing condition AEDT model were applied.
- **Runway use:** Changes to runway use are not expected in the forecast year; therefore, definition and use of noise model tracks from the 2019 existing condition AEDT model were applied.
- **Aircraft performance:** Standard performance profiles were used, and departure stage lengths for fixed-wing aircraft departures were assigned based on great-circle distance from LIH to the expected destinations. Markets identified in the forecast were accounted for in the 2027 departure stage length assessment.

Refer to Chapter 2 for more information on the data inputs for the 2027 forecast conditions AEDT model.

The LIH aviation activity forecasts prepared for the Master Plan Update and Part 150 NEM Update study were completed in March 2020, at the beginning of the COVID-19 pandemic. The uncertainties documented in Master Plan Forecast Report (refer to Appendix B) related to the severity and duration of the contraction in aviation activity resulting from the COVID-19 pandemic remain pertinent. While the United States has shown signs of recovery, other countries and economies in the world remain affected by widespread infections and slower vaccination rates.

In the FAA's 2020 TAF, the FAA noted the following: "There is uncertainty associated with the forecasts because of the uncertainty regarding the path of the [COVID-19] pandemic and its economic impacts. Particular attention was spent on forecasting the near-term recovery back to 2019 activity." According to the FAA and as noted earlier, the forecast demand for passengers and aircraft operations documented in the Master Plan Forecast Report will be delayed by approximately four years (with LIH reaching 2019 levels in 2025). A comparison between the Master Plan Forecast and the FAA's 2020 TAF for the years between 2025 and 2027 indicates that the Master Plan Forecast is within 10 percent of the FAA's 2020 TAF and therefore within the FAA's variance criteria considered to be consistent with the TAF.[8] **Table 1.3-1** lists the total annual operations for LIH as stated in the Master Plan Forecast and the FAA's TAF, as well as the variance between the two forecasts.

TABLE 1.3-1 LIHUE AIRPORT MASTER PLAN FORECAST AND FEDERAL AVIATION ADMINISTRATION 2020 TERMINAL AREA FORECAST COMPARISON

YEAR	MASTER PLAN FORECAST	FAA 2020 TAF	VARIANCE (%)
2025	143,020	132,270	8
2026	144,198	136,168	6
2027	145,378	138,792	5

NOTES:
FAA – Federal Aviation Administration
TAF – Terminal Area Forecast
SOURCES: Ricondo & Associates, Inc., *Lihue Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*, March 2020; US Department of Transportation, Federal Aviation Administration, *2020 Terminal Area Forecast*, May 2021.

8 US Department of Transportation, Federal Aviation Administration, https://www.faa.gov/airports/planning_capacity/media/approval_local_forecasts_2008.pdf (accessed October 11, 2021).

The number of aircraft operations reported in the Master Plan Forecast for 2027 was used to develop the operations levels for the 2027 forecast conditions and have the potential to be higher than what might actually occur post–COVID-19 pandemic recovery. However, the Master Plan Forecast 2027 operations are not more than 10 percent higher than the number of operations reported in the FAA's TAF for 2027. Due to the difficulty in determining the forecast impacts caused by the COVID-19 pandemic, it is uncertain as to what year the forecast operation levels will occur; however, based on both forecasts, it is reasonable to assume the Master Plan Forecast operation levels for 2027 represent operation levels at least five years from the year when the Study is submitted to the FAA for review. Therefore, the calculated noise exposure for 2027 represents conditions at least five years in the future.

1.3.2 NOISE METRICS

The FAA has stipulated that NEMs prepared under 14 CFR Part 150 be based on the annual day-night average sound level (DNL) noise metric. This metric was developed under the auspices of the US Environmental Protection Agency (EPA); it embodies extensive information regarding the physical description of transportation noise as related to human annoyance in residential areas.

DNL represents average noise levels over a 24-hour period, which are expressed in A-weighted decibels (dBA),[9] a sound pressure level metric that emphasizes sound at the frequency range over which the human ear is most sensitive. In the calculation of DNL, sound events occurring during the nighttime hours (10:00 p.m. to 7:00 a.m.) are increased by a 10-decibel weighting to represent the increased sensitivity of people to noise that occurs at night and the lower ambient noise levels during those hours. Aircraft DNL values represent the cumulative effects of all aircraft operations occurring during an average 24-hour period, referred to as the AAD, derived from aircraft operations data for an entire calendar year. The noise exposure contours depicted on NEMs are lines connecting points of equal noise level; for the Part 150 NEM Update study, the FAA-required levels are DNL 65 dBA, DNL 70 dBA, and DNL 75 dBA. Airport sponsors can opt to show noise contours at lower levels, but these must be differentiated from the levels required by the FAA if they have not been adopted as a planning standard by the local communities. The Part 150 NEM Update study includes noise contours for the DNL 55 dBA and DNL 60 dBA levels to assess the State of Hawaii's (State's) land use compatibility guidelines, as described in Section 1.3.4.

1.3.3 FEDERAL AVIATION ADMINISTRATION AIRCRAFT NOISE AND LAND USE COMPATIBILITY

To understand the relationship between land uses and noise exposure associated with arriving and departing flights at an airport, 14 CFR Part 150 requires that land uses in the airport environs be reviewed. This includes delineation of land uses within the DNL contours and the identification of noise-sensitive uses that may be incompatible with the various levels of noise exposure.

Guidelines regarding the compatibility of land uses within various DNL contour intervals are specified in Appendix A of 14 CFR Part 150 (Table 1, "Land Use Compatibility with Yearly Day-Night Average Sound Level"). These guidelines are consistent with land use guidelines developed by other federal agencies, such as the US EPA and the US Department of Housing and Urban Development (HUD) and will be used in the Part 150 NEM Update study. The guidelines are provided in **Table A.2-2** of **Appendix A** of this document.

9 US Department of Transportation, Federal Aviation Administration, https://www.faa.gov/regulations_policies/policy_guidance/noise/glossary/ (accessed August 30, 2021). In studying the impact of airport noise on humans, decibels on the "A" weighted scale (dBA) are often used. This scale most closely approximates the relative loudness of sounds in the air as perceived by the human ear.

The FAA has determined that the major land uses listed in Table A.2-2 of Appendix A are normally compatible with aircraft noise less than DNL 65 dBA. Therefore, when evaluating land use compatibility, attention is focused on uses exposed to DNL 65 dBA and higher. As shown in Table A.2-2, the noise-sensitive land uses initially considered as incompatible can be compatible if noise attenuation is designed or retro-fitted into the building's structure to meet the noise level reductions (NLRs). These noise-sensitive land uses include residential, mobile home parks, transient lodging, schools, outdoor music venues, hospitals, nursing homes, places of worship,[10] auditoriums, and concert halls.

Commercial, manufacturing, and recreational land (parks, amusement parks, zoos, etc.) are generally less sensitive to noise and are considered compatible within noise levels up to DNL 70 dBA without noise attenuation and up to DNL 80 dBA with appropriate levels of noise attenuation.

Noise-sensitive areas within calculated levels of DNL 65 dBA and higher are not necessarily confirmed as being incompatible or eligible for mitigation; rather, these land use designations are initially considered incompatible and require further investigation. Factors that influence compatibility and/or eligibility for compatibility may include previous sound reduction treatments, current interior noise levels, structure condition, ambient and self-generated noise levels, whether a given use is considered temporary or permanent, and the timeframe within which a given structure was constructed.[11]

1.3.4 STATE LAND USE COMPATIBILITY GUIDELINES

DOT-A considers other noise compatibility and noise standards in addition to the FAA's aircraft and noise land use compatibility standards due to the outdoor lifestyle of the people and because most of Hawaii's residential structures are naturally ventilated. In accordance with 14 CFR Part 150 Section A150.101(d), the local aircraft noise land-use compatibly standards are based on local requirements and determinations associated with the local needs and values that dictate further delineation of compatibility. Application of local guidelines is also consistent with the 14 CFR Part 150 Table 1 – *Land Use Compatibility* With Yearly Day-Night Average Sound Levels* asterisk note which states:

> "The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses."

The outdoor-to-indoor sound reduction of these residential structures is moderately low (9 dBA), thus the exterior noise level of DNL 65 dBA does not eradicate all the risks of adverse noise impacts. The other noise compatibility standards are summarized as follows:

- US EPA 550/9-74-004 recommends that an exterior noise level of DNL 55 dBA is considered as "Unconditionally Acceptable or Near-Zero Risk."

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[10] Places of worship represents facilities similar to "churches" as indicated in Table A.2-2 of Appendix A.

[11] On March 27, 1998, the FAA issued a policy on 14 CFR Part 150 airport noise compatibility programs that limits approval of remedial mitigation measures, e.g., soundproofing, property acquisitions, and relocation, to land uses that were in place as of October 1, 1998, unless an airport sponsor can demonstrate that DNL contours were not published prior to that date. New non-compatible uses resulting from airport expansion may be eligible for consideration.

- American National Standards Institute (ANSI) S3.23-1980 recommends "to incorporate the lower outdoor-to-indoor NLR characteristics of naturally ventilated structures and provide additional weight to extensive outdoor land uses."
- Federal Housing Authority / HUD and the US Department of Veterans Affairs acknowledge that noise levels between DNL 55 dBA and DNL 65 dBA have an adverse impact on communities. However, due to the cost and feasibility to enforce the DNL 55 dBA, the DNL 65 dBA has been selected as the regulatory standard.

As a result of reviewing all available noise compatibility standards, DOT-A established a compromise between the near-zero risk level of DNL 55 dBA and the significant risk level of DNL 65 dBA for naturally ventilated structures. DOT-A established stringent local land use compatibility guidelines and recommended that an aircraft noise limit of DNL 60 dBA should be used as a planning level for noise-sensitive land uses involving naturally ventilated structures, such as residential and public use (e.g., schools, libraries, places of worship, clinics, and meeting rooms). The State land use compatibility guidelines were taken from State of Hawaii statutes and the previous 14 CFR Part 150 NEM AND NCP reports published by DOT-A and are summarized in **Table A.2-3** of Appendix A.[12] [13,14]

The 1989 Lihue Airport 14 CFR Part 150 NEM and NCP Study noted that DOT-A consulted with the FAA to determine if the noise mitigation measures in areas subject to noise levels between DNL 60 dBA to DNL 65 dBA would be eligible for federal funding under the Part 150 NCP. According to the FAA's Honolulu District Office, the recommended noise mitigation measures are subject to specific case-by-case review for federal funding requests.

For the Part 150 NEM Update study, both the FAA guidelines and State recommended land use guidelines have been used to identify compatible and incompatible land uses.

Table 1.3-2 summarizes the general deviations of the State recommended land use guidelines from the FAA land use compatibility guidelines.

1.3.5 SUPPLEMENTAL INFORMATION

The DNL 55 dBA noise contour is presented as supplemental information for stakeholders, as they consider the noise environment around the Airport and support the DOT-A noise land use policy. The 1989 Lihue Airport 14 CFR Part 150 NEM and NCP Study recommended application of DNL 55 dBA and higher to notify buyers of potential aircraft noise impacts.[15] The pursuit of this requirement was approved by the FAA in review of the 1989 Lihue Airport 14 CFR Part 150 NEM and NCP Study.[16] However, there is no codified State or local law that specifies this requirement. Session Laws of Hawaii (SLH) 1987, Act 208 (mentioned in the 1989 Lihue Airport 14 CFR Part 150 NEM and NCP Study) refers only to real property and Hawaii Revised Statutes (HRS) 508D-15 refers to residential

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[12] Hawaii Revised Statutes 205-2, *Districting and Classification of Lands*.

[13] State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Program: Volume I -– Noise Exposure Map Report and Volume II -– Noise Compatibility Program Report*, 1989.

[14] State of Hawaii Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Update*, April 2013.

[15] State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Program: Volume I – Noise Exposure Map Report*, May 1989, pp. 31, 258, and 264.

[16] US Department of Transportation, Federal Aviation Administration, Record of Approval Letter, February 1992.

real property.[17,18] As a result, the DNL 55 dBA noise contour and number of residential units located within the noise contour is provided for State of Hawaii informational purposes only.

TABLE 1.3-2 SUMMARY OF DEVIATIONS OF THE STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION – AIRPORTS DIVISION RECOMMENDED LAND USE GUIDELINES FROM THE FAA LAND USE GUIDELINES

DOT-A RECOMMENDED GUIDELINES
Land Use Category Recommendations
Residential land use category is delineated into low density and high density.
Additional land use categories included under recreation: professional/resort sport facilities, locations of media events, extensive natural wildlife, and recreation areas.
Noise Level and Noise Level Reduction (NLR) Recommendations
Criteria of yearly DNL ranges in DOT-A recommended guidelines are below DNL 60 dBA to DNL 85 dBA in lieu of below DNL 65 dBA to over DNL 85 dBA in FAA guidelines.
NLR should achieve interior levels of DNL 45 dBA or less into building codes and be considered in individual approvals. Normal local construction can be expected to provide an average NLR of approximately 9 dBA.
NLR requirements should be evaluated and not be based solely upon the exterior DNL exposure level for schools, indoor auditoriums, concert halls, studios without outdoor sets, broadcasting, and production facilities.
No indication of dBA measurement to achieve required NLR for the design and construction of buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

NOTES:
DNL – Day-Night Average Sound Level
dBA – A-Weighted Decibels
NLR – Noise Level Reduction
SOURCES: Hawaii Revised Statutes 205-2, *Districting and Classification of Lands*; State of Hawaii Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Update*, April 2013; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Plan, Volume 1, Noise Exposure Map Report*, May 1989; Ricondo & Associates, October 2021.

[17] Hawaii State Legislature, https://www.capitol.hawaii.gov/slh/Years/SLH1987/Volume1/SLH1987_Act208.pdf (accessed November 29, 2021).

[18] Kawaoka, Lynette, Planner, State of Hawaii Department of Transportation – Airports Division, "State Disclosure for 60 and 55 DNL Contours," email to Ricondo & Associates, Inc. Staff, November 23, 2021.

2. DATA PREPARATION AND NOISE MODELING

The data required for the preparation of NEMs under 14 CFR Part 150 includes basemaps, land use, zoning, dwellings, population, and airport/aircraft operational and procedural data. The following subsections describe each data set used to model the aircraft noise and compute the impacts of aircraft operations at LIH.

2.1 BASEMAPPING

For existing zoning and land use, noise model tracks, and NEMs, a 2019 orthoimage[19] was used as the base. Additionally, primary roadways[20] and census county division boundaries[21] are added to provide geographic reference. The basemap also depicts the existing airport property boundary as well as the future airport property boundary and future airport easements for reference. Future airport property will avoid the Lihue Refuse Transfer Station, located directly north of existing Airport property, and future airport easements will include areas necessary for transportation access. The basemap extent is within the Puhi-Hanamaulu Census County Division Boundary and the Lihue Census County Division Boundary. The County of Kauai has jurisdiction over land uses around the Airport; however, the county boundary lines are not shown on the basemap because the county comprises the entire island. The subsequent section details existing and future airfield configurations.

2.2 AIRFIELD

The following subsections describe the configuration of the major airfield components at LIH.

2.2.1 EXISTING AIRFIELD

Exhibit 2.2-1 depicts the location of the existing runways, taxiways, and helipads.

2.2.1.1 RUNWAYS

LIH has two runways:

- Runway 3-21: oriented in a northeast–southwest direction
- Runway 17-35: oriented in a north–south direction

Table 2.2-1 presents additional information regarding the existing runways at LIH based on the FAA-approved ALP. Runway 3-21 is 6,500-feet long and 150-feet wide. There is a 205-foot displaced threshold at the Runway 21 end. The Runway 3 end elevation is approximately 153 feet above mean sea level (MSL), and the Runway 21 end elevation is approximately 80 feet above MSL. Runway 17-35 is 6,500-feet long and 150-feet wide. The Runway 17 end elevation is approximately 92 feet above MSL, and the Runway 35 end elevation is approximately 92 feet above MSL.

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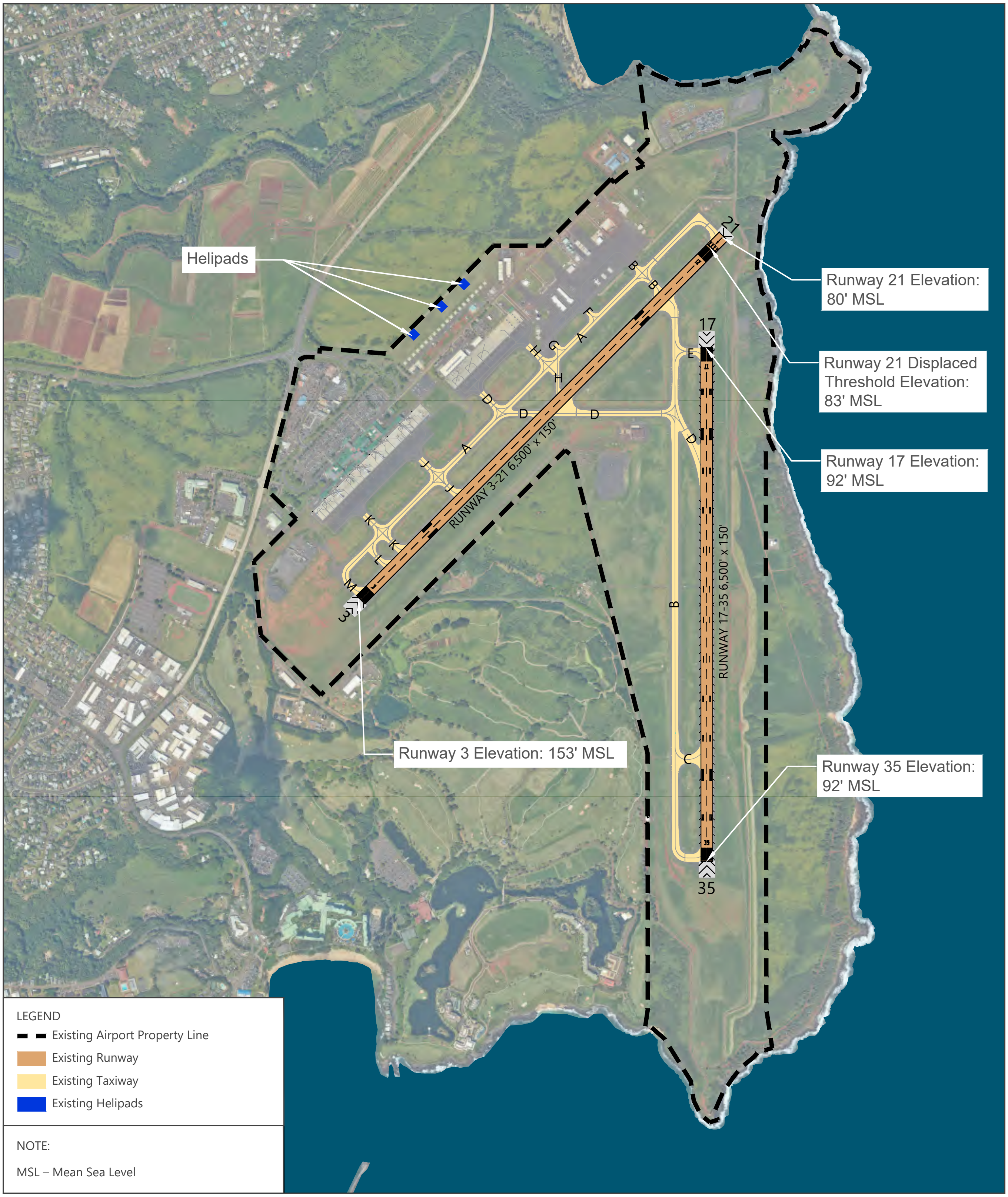
[19] Woolpert, August 2019.

[20] US Census Bureau, 2021, https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2021&layergroup=Roads (accessed September 15, 2021).

[21] State of Hawaii, 2020, https://geoportal.hawaii.gov/datasets/HiStateGIS::2020-census-county-divisions-districts/about (accessed October 19, 2021).



SOURCES: State of Hawaii, Department of Transportation – Airports Division, *Conditonal Airport Layout Plan Approval*, October 2020; Woolpert, August 2019 (aerial imagery); Ricondo & Associates, Inc., October 2021.

NORTH 0 1,800 ft.

EXHIBIT 2.2-1

AIRFIELD CONFIGURATION - 2019 EXISTING CONDITION

Drawing: P:\project-chicago\Hawaii\LIH\07-master plan\2-NEM\2.4-NEM Documentation\Exhibits\CAD\Exhibit 2.2-1-2 Airfield Facilities.dwgLayout: Existing Plotted: Jan 20, 2023, 02:21PM

TABLE 2.2-1 RUNWAY CHARACTERISTICS – 2019 EXISTING CONDITION

DESCRIPTION	RUNWAY 3	RUNWAY 21	RUNWAY 17	RUNWAY 35
Runway Length (feet)	6,500		6,500	
Runway Width (feet)	150		150	
Runway Surface Type	Asphalt		Asphalt	
Runway Surface Treatment	Grooved		Grooved	
Runway Pavement Strength by PCN	75/F/A/W/T		75/F/A/W/T	
Runway Pavement Strength				
Single-Wheel (pounds)	75,000		75,000	
Double-Wheel (pounds)	200,000		175,000	
Double Tandem (pounds)	350,000		250,000	
Dual Double Tandem (pounds)	730,000		630,000	
Runway Lighting	MIRL		HIRL	
Runway End Elevation (feet)	152.5	80.4	91.5	91.5
Effective Gradient	-1.11%	1.11%	0.00%	-0.00%
Displaced Threshold (feet)	None	205	None	None
Declared Distances (feet)				
Takeoff Run Available (TORA)	6,500	6,500	6,500	6,500
Takeoff Distance Available (TODA)	6,500	6,500	6,500	6,500
Accelerate-Stop Distance Available (ASDA)	6,500	6,500	6,500	6,500
Landing Distance Available (LDA)	6,500	6,295	6,500	6,500
Navigational Aids	Visual	RNAV (GPS), RNAV (RNP), VOR/DME, TACAN	RNAV (GPS)	LOC, GS, RNAV (GPS), RNAV (RNP), VOR, TACAN
Visual Aids	PAPI, REIL, LDIN	PAPI, REIL	PAPI, REIL	PAPI, MALSR
Runway Design Code (RDC)	C/IV/VIS	C/IV/5000	C/IV/5000	C/IV/2400
Approach Reference Code (APRC)	D/V/VIS D/IV/VIS	D/IV/5000 D/V/5000	D/IV/5000 D/V/5000	D/IV/2400 D/V/2400
Departure Reference Code (DPRC)	D/IV D/V	D/IV D/V	D/IV D/V	D/IV D/V

NOTES:
A refers to high strength subgrade for flexible pavement.
F refers to flexible pavement.
W refers to no tire pressure limit.
T refers to PCN value obtained by a technical evaluation.
GS – Glideslope
HIRL – High Intensity Runway Lights
LDIN – Lead-in Lights
LOC – Localizer
PAPI – Precision Approach Path Indicator
PCN – Pavement Classification Number
MALSR – Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL – Medium Intensity Runway Lights
REIL – Runway End Identifier Lights
RNAV (GPS) – Area Navigation – Global Positioning System
RNAV (RNP) – Area Navigation – Required Navigation Performance
TACAN – Tactical Air Navigation System
VIS – Visual
VOR/DME – Very High Frequency Omnidirectional Range with Distance Measuring Equipment
SOURCES: State of Hawaii, Department of Transportation – Airports Division, *Conditional Airport Layout Plan Approval* October 2020; State of Hawaii, Department of Transportation – Airports Division, *Airport Layout Plan Narrative Report*, August 2019; Ricondo & Associates, Inc., December 2021.

2.2.1.2 TAXIWAYS

As shown on Exhibit 2.2-1, a series of taxiways connects the two runways to the passenger terminal complex, air cargo aprons, fixed base operator facilities, and general aviation areas. Full-length taxiways run parallel to the two runways. Taxiway A and Taxiway B move aircraft parallel to Runways 3-21 and 17-35, respectively, when departing aircraft position for takeoff, or when arriving aircraft taxi to their gates after arrival. Individual connector taxiways connect the parallel taxiways to the runways. Taxiway D connects Taxiway A with Taxiway B.

2.2.1.3 HELIPORT

The heliport at LIH is located adjacent to Ahukini Road, northeast of the passenger terminal complex. Helicopter tour companies use the heliport for conducting operations to and from the Airport. There are three helipads located along the western edge of the heliport, 20 concrete helicopter passenger loading/unloading apron pads (1,600 square feet each) in the ramp area, and a grassed-surface taxi lane. The area where helicopters operate encompasses approximately 335,550 square feet. One helipad in the middle of the three helipads was modeled in the AEDT due to the proximity of the three helipads to each other.

2.2.2 FUTURE AIRFIELD

Exhibit 2.2-2 depicts the future airfield configuration with the runway improvements described in the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final EA* (March 2018) and on the FAA-approved ALP. **Table 2.2-2** presents additional information regarding the future airfield configuration at LIH, as expected in 2027.

2.2.2.1 RUNWAYS

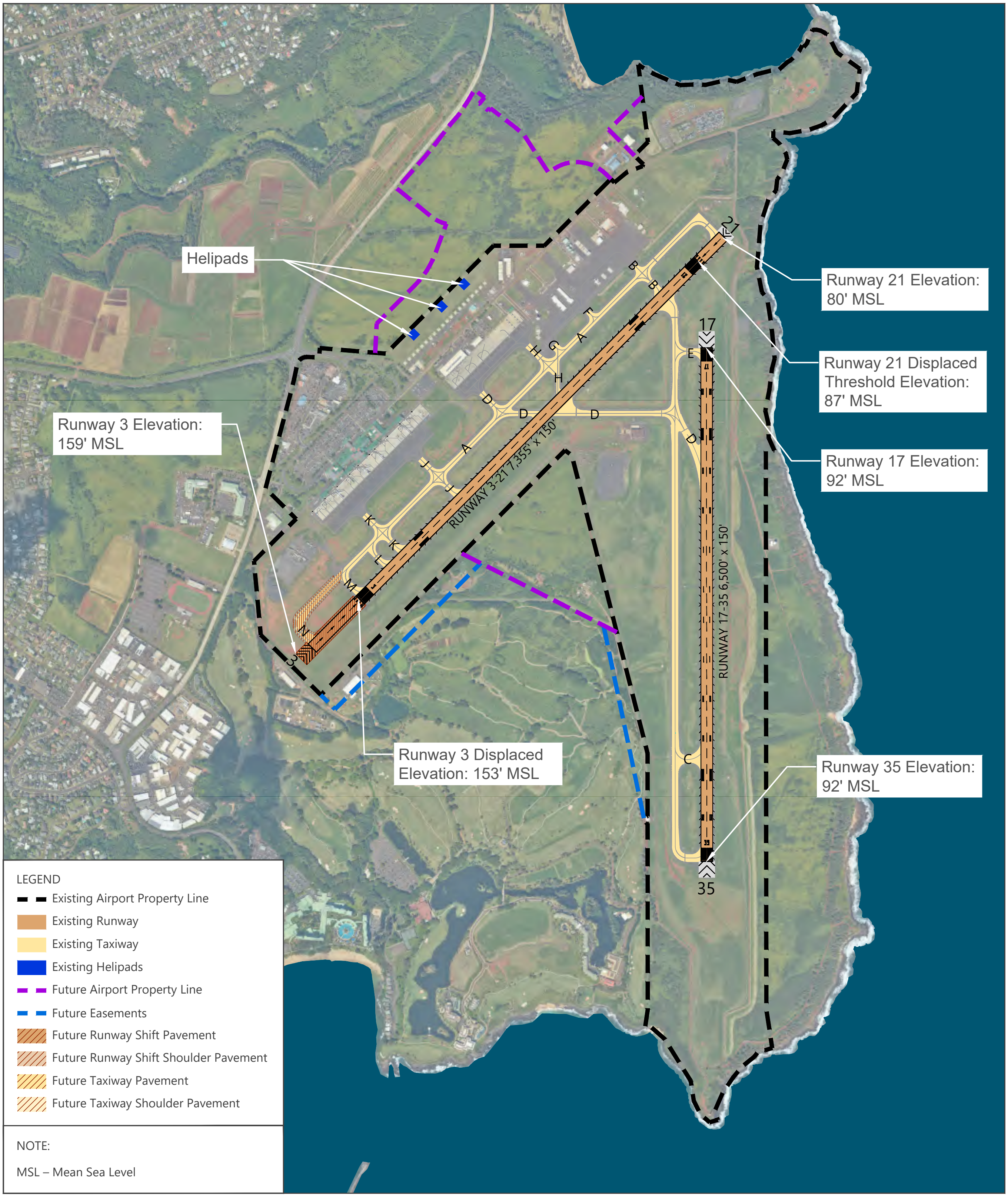
The RSA improvements to Runway 3-21 will increase the overall paved runway length by 855 feet, from 6,500 feet to 7,355 feet. The RSA improvements will not result in any changes to the runway capability or the types or percentages of aircraft that will use the runway. The primary components of the RSA improvements that affect operations and associated aircraft noise are summarized as follows:

- The departure end of Runway 3 shifts 855 feet to the southwest. The landing threshold will remain in the same location, resulting in an 855-foot displaced threshold for landings on Runway 3. This shift of the departure end of Runway 3 will allow aircraft to take off from the new runway end, 855 feet southwest of where aircraft take off under the existing condition.
- The existing Runway 21 landing displaced threshold will move 250 feet farther from the runway end, increasing the current displacement of 205 feet to 455 feet from the end of runway pavement (excludes blast pad pavement). This provides the 600 feet of the 1,000 feet standard for the RSA at the end of Runway 21.
- Construction, installation, relocation, and/or upgrade of various navigational and visual aids include, but are not limited to, runway end identifier lights (REILs), precision approach path indicators (PAPIs), runway threshold and edge lights, and taxiway edge lighting, signage, and associated utility lines. This equipment is necessary to ensure the safety of air navigation for aircraft operations at the Airport.

Based on review of the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final EA,* the RSA improvements to Runway 3-21 are not expected to cause a change in the type of aircraft and number of operations; therefore, the 2027 forecast conditions assumes the same type of operations with or without the RSA improvements. No changes are planned for Runway 17-35.

2.2.2.2 TAXIWAY

The Runway 3-21 RSA improvements will include a taxiway extension (Taxiway N) to the relocated departure end of Runway 3.



SOURCES: State of Hawaii, Department of Transportation – Airports Division, *Conditional Airport Layout Plan Approval*, October 2020; Woolpert, August 2019 (aerial imagery); Ricondo & Associates, Inc., October 2021.

NORTH 0 1,800 ft.

EXHIBIT 2.2-2

AIRFIELD CONFIGURATION - 2027 FORECAST CONDITIONS

Drawing: P:\project-chicago\Hawaii\LIH\07-master plan\2-NEM\2.4-NEM Documentation\Exhibits\CAD\Exhibit 2.2-1-2 Airfield Facilities.dwgLayout: Future Plotted: Jan 20, 2023, 02:19PM

TABLE 2.2-2 RUNWAY CHARACTERISTICS – 2027 FORECAST CONDITIONS

DESCRIPTION	RUNWAY 3	RUNWAY 21	RUNWAY 17	RUNWAY 35
Runway Length (feet)	7,355		6,500	
Runway Width (feet)	150		150	
Runway Surface Type	Asphalt		Asphalt	
Runway Surface Treatment	TBD		Grooved	
Runway Pavement Strength by PCN	TBD		TBD	
Runway Pavement Strength				
Single-Wheel (pounds)	75,000		75,000	
Double-Wheel (pounds)	200,000		175,000	
Double Tandem (pounds)	350,000		250,000	
Dual Double Tandem (pounds)	730,000		630,000	
Runway Lighting	MIRL		HIRL	
Runway End Elevation (feet)	159.34	80.4	91.5	91.5
Effective Gradient	-1.07%	1.07%	TBD	TBD
Displaced Threshold (feet)	855	455	None	None
Declared Distances (feet)				
Takeoff Run Available (TORA)	7,355	6,500	6,500	6,500
Takeoff Distance Available (TODA)	7,355	6,500	6,500	6,500
Accelerate-Stop Distance Available (ASDA)	6,500	6,750	6,500	6,500
Landing Distance Available (LDA)	5,645	6,295	6,500	6,500
Navigational Aids	Visual	RNAV (GPS), RNAV (RNP), VOR/DME, TACAN	RNAV (GPS)	LOC, GS, RNAV (GPS), RNAV (RNP), VOR, TACAN
Visual Aids	PAPI, REIL, LDIN	PAPI, REIL	PAPI, REIL	PAPI, MALSR
Runway Design Code (RDC)	C/IV/VIS	C/IV/5000	C/IV/5000	C/IV/2400
Approach Reference Code (APRC)	D/V/VIS D/IV/VIS	D/IV/5000 D/V/5000	D/IV/5000 D/V/5000	D/IV/2400 D/V/2400
Departure Reference Code (DPRC)	D/IV D/V	D/IV D/V	D/IV D/V	D/IV D/V

NOTES:
GS – Glideslope
HIRL – High Intensity Runway Lights
LDIN – Lead-in Lights
LOC – Localizer
PAPI – Precision Approach Path Indicator
PCN – Pavement Classification Number
MALSR – Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL – Medium Intensity Runway Lights
REIL – Runway End Identifier Lights
RNAV (GPS) – Area Navigation – Global Positioning System
RNAV (RNP) – Area Navigation – Required Navigation Performance
TACAN – Tactical Air Navigation System
TBD – To Be Determined
VIS – Visual
VOR/DME – Very High Frequency Omnidirectional Range with Distance Measuring Equipment
SOURCES: State of Hawaii, Department of Transportation – Airports Division, *Conditional Airport Layout Plan Approval*, October 2020; State of Hawaii, Department of Transportation – Airports Division, *Airport Layout Plan Narrative Report*, August 2019; Ricondo & Associates, Inc., December 2021.

2.3 TERRAIN DATA

Terrain data provide the elevation of the ground surrounding an airport and on-airport property. The AEDT uses the US Geological Survey (USGS) terrain data to adjust the ground level under the flight paths and thereby determine the vertical distance between the aircraft and a “receiver” on the ground. This distance affects the assumptions about how noise propagates over the ground. The digital elevation models were downloaded from the USGS and imported into the AEDT model.

2.4 WEATHER DATA

The AEDT accounts for temperature, relative humidity, air pressure, and headwind as part of its noise calculation process. Temperature, relative humidity, and air pressure affect noise attenuation as noise travels from the source to the receiver. AEDT also uses other weather components such as, the wind magnitude to account for the effects on aircraft performance. Airport-specific weather data derived from the NOAA Global Summary of the Day (GSOD) data in the AEDT program database was used for acoustic modeling to provide annual average weather conditions for LIH. For noise modeling, the 10-year average (2011 to 2020) weather data at the Airport were selected as shown in **Table 2.4-1**. The same 10-year average values were used for the 2027 forecast conditions as well.

TABLE 2.4-1 LIHUE WEATHER DETAILS

COMPONENT	10-YEAR AVERAGE (2011–2020)
Temperature (°F)	75.75
Sea Level Pressure (millibars)	1,016.94
Relative Humidity (%)	77.07
Dew Point (°F)	68.03
Wind Speed (Knots)	11.09

SOURCES: US Department of Transportation, Federal Aviation Administration, Aviation Environmental Design Tool (AEDT), Version 3d, March 29, 2021; Ricondo & Associates, Inc., November 2021.

2.5 LAND USE AND ZONING

Jurisdiction over land use planning and zoning in the County of Kauai belongs to the County of Kauai. The county boundary lines are not shown on the basemap due to being outside the map scale requirements and including the entire island; the census county division boundaries are shown to serve as geographic reference. The basemap extent is within the Puhi-Hanamaulu Census County Division Boundary and the Lihue Census County Division Boundary. Existing land use data and zoning information were readily available for the County of Kauai.[22]

2.5.1 EXISTING CONDITIONS

2.5.1.1 EXISTING LAND USE

Exhibit 2.5-1 shows the existing land uses surrounding the Airport. The Lihue Urban Center, an intensive area classified as general commercial and industrial uses, is located west of LIH. Land uses within the LIH property boundary include those owned primarily by the State of Hawaii and are related to LIH operations and land leased by DOT-A to Airport tenants. Residential communities nearest to LIH are located to the northwest. Much of the land adjacent to the Airport is developed for public uses, including the Lihue Refuse Transfer Station, the Ahukini Recreation Pier State Park, and Hanamaulu Bay to the north; the Lihue Wastewater Treatment Facility to the south; the Kauai Police Department, Kauai County Civil Defense Office, State of Hawaii Circuit Court, and Kauai Veterans Center to the west; and the County of Kauai’s Vidinha Stadium sports complex to the southwest.

[22] SSFM International, *Kauai Kakou: Kauai County General Plan*, February 2018.

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvement – Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads).

NORTH

0 2,000 ft

EXHIBIT 2.5-1

EXISTING LAND USES – COUNTY OF KAUAI

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To the south and southwest of LIH are a golf course; natural areas; and a mix of high-density and low-density transient lodging, including resorts, hotels, condominium hotels, timeshares, and individual vacation units. The transient lodging south and southwest of LIH include Marriott's Kauai Lagoons Kalanipu'u, Kalapaki Circle, Kauai Marriott Resort / Beach Club, Banyan Harbor Resort, and Kauai Inn.

Southeast of LIH is Nawiliwili Harbor and numerous industrial facilities supporting harbor operations, which include harbor piers, storage facilities, and distribution centers. Kauai Petroleum, Honsador Lumber, the Kauai Food Bank, and Garden Isle Disposal operate out of this area. Located farther west on Rice Street are smaller commercial establishments, the Lihue Civic Center, and residential areas.

Farther west of the Airport is the city of Lihue, the island of Kauai's center of business, government, and transportation services. The major commercial and civic center of Lihue is designated as the Neighborhood Center, an area with mixed uses, such as retail and service, civic, and residential; the area supports an interconnected network of streets for multimodal transportation access. As home to Nawiliwili Harbor—the island's only deep-water commercial port—and to LIH, the Lihue region has emerged as the focal point for heavy and light industrial and commercial activities and services, such as warehousing, baseyard operations, automotive sales and maintenance, and retailing for equipment and materials suppliers.

2.5.1.2 EXISTING ZONING

Zoning is the traditional mechanism used by local governments to control land use. Zoning controls the location, type, and intensity of new urban land uses, and it can be an important tool in preventing incompatible land uses from locating around airports. The legal basis for zoning powers is the protection of public health, safety, and welfare of residents.

As shown on **Exhibit 2.5-2**, LIH is zoned by the County of Kauai as an Industrial and Special Treatment-Public Facilities Overlay District.[23] Special Treatment-Public Facilities Overlay Districts specify that additional performance is required when critical or valuable social or aesthetic characteristics of the environment or community exist in the same area as a parcel where particular functions or uses may be developed. Special Treatment-Public Facilities Overlay Districts are implemented as overlays to the traditional zoning.[24] Pursuant to Kauai County Code (KCC) Section 8-11.3, Generally Permitted Uses, Structures, and Development within the Special Treatment Districts, "all uses, structures, or development shall require a [zoning] Use Permit, except repairs or modifications of land and existing structures that do not substantially change the exterior form or appearance of the three (3) dimensional structures or land." Furthermore, KCC Section 8-11.3 also states that, "in addition, such repairs or modifications do not require a Zoning Permit."

[23] County of Kauai, *Lihue Community Plan*, Ordinance 935, June 2015.

[24] County of Kauai, Planning Department, Zoning and Land Use Permits, http://www.kauai.gov/Government/Departments/Planning-Department/Zoning-Land-Use-Permits (accessed August 16, 2016).

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (census county divisions); SSFM International, Inc., 2018, Kauai County Zoning Ordinance, 2018 (zoning); State of Hawaii, Department of Transportation – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., March 2021 (multi-family residential).

NORTH
0 2,000 ft

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EXHIBIT 2.5-2

EXISTING ZONING – COUNTY OF KAUAI

Land zoned by the County of Kauai for agriculture is located within and adjacent to existing Airport property to the north, east, and between Runway 3-21 and Runway 17-35. Although portions of Airport property are zoned for agriculture, Airport property is currently used for transportation and natural land uses, as shown on Exhibit 2.5-1. Conservation zones border Hanamaulu Bay to the north and along the coast east of Runway 17-35. The nearest commercial zones are located west and south of LIH. Single-family and multi-family residential zones surround the Airport from the northwest to the southwest. Two resort zones are southwest of the Runway 35 end.

The County of Kauai does not have an adopted set of aircraft noise compatibility guidelines in the current zoning ordinance.

2.5.2 FORECAST CONDITIONS

As shown on **Exhibit 2.5-3**, six future off-Airport development projects within the Airport environs were considered to evaluate potential changes to the existing land use and noise impacts.

According to the *Lihue Community Plan* (June 2015), five development projects are anticipated to be complete by 2035: Kohea Loa, Wailani Phase I, Wailani Phase II / Ahukini Mauka, Puakea, and Waiola. The Kohea Loa development, located along the Kuhio Highway is northwest of LIH and Hanamaulu Bay. The development is owned by DR Horton and is planned to provide 440 residential homes. The existing land use of the Kohea Loa project is already designated as Residential Community. Located northwest of LIH along the Kapule Highway, Wailani Phase I and Wailani Phase II / Ahukini Mauka are planned by Grove Farm (a subsidiary of Visionary LLC) and will be for mixed use that includes residential, retail, offices, and a town center. The existing land use of this mixed-use development is already designated as Urban Center. The Puakea and Waiola development projects, also owned by Grove Farm, will provide a total of 266 single-family homes. This entitled residential development will be located far south of the Airport and Nawiliwili Road. The existing land uses of the planned Puakea and Waiola developments are already designated as Residential Community.[25]

The sixth off-Airport development project to the south of LIH is identified in Timbers Resorts Kauai's Hokuala Phase I Master Plan. Specifically located between the ends of Runway 3 and Runway 35, the planned development is for residential, including timeshares, single family dwellings, condominiums, townhomes, and a boutique hotel.[26] The existing land use of the development is designated as golf course, although zoning indicates single-family residential near the area of the proposed development.[27]

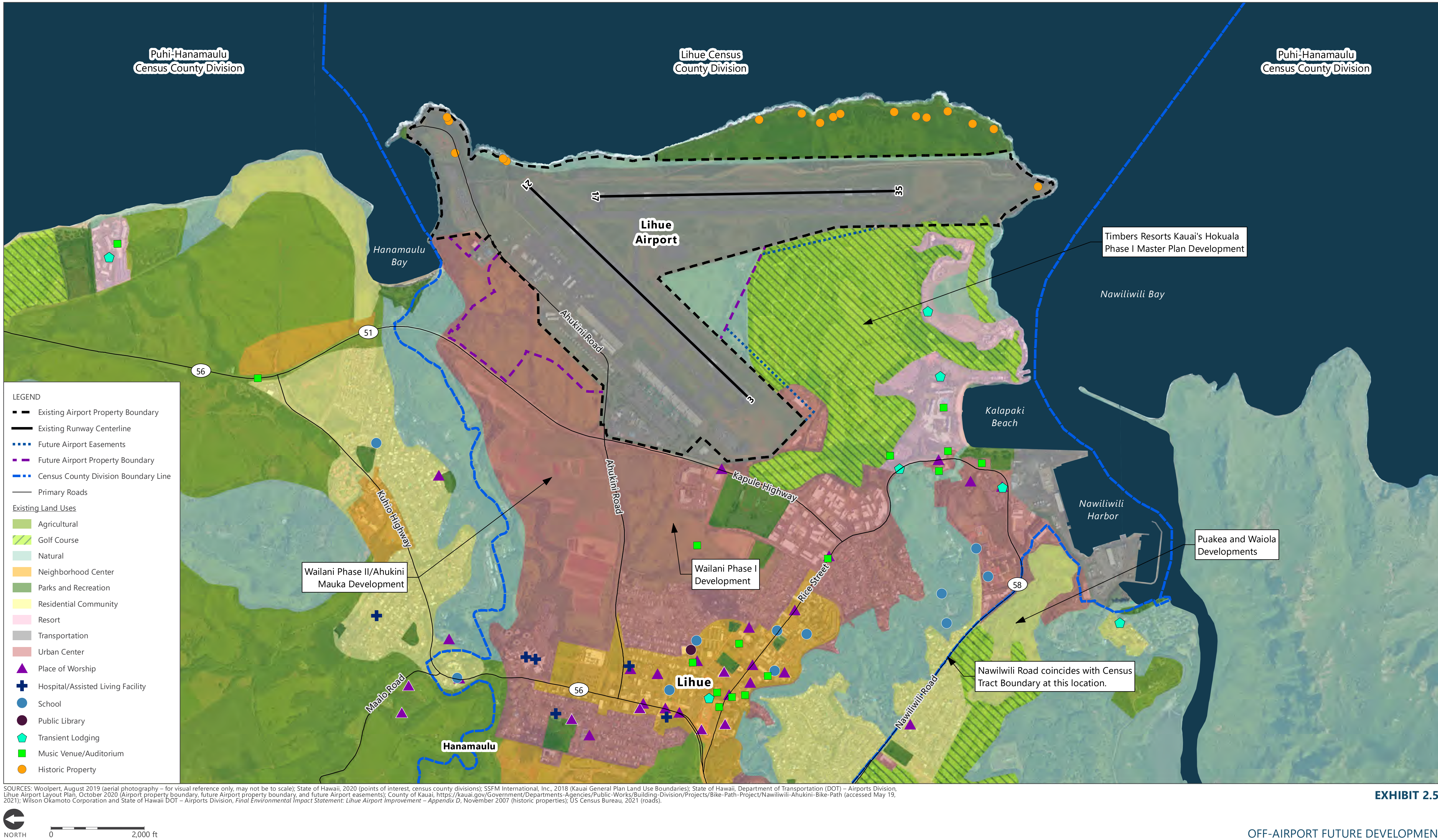
2.6 POPULATION AND DWELLING UNITS

Demographic information related to population and housing unit data was incorporated into the geographic information system (GIS). US Decennial Census Data for 2020 by Census Tract was used to calculate a population factor for each census tract intersecting the 2019 existing or 2027 forecast conditions. Dwelling units were manually counted within the environs of the Airport using a combination of land use, aerial survey, and the County of Kauai's assessor's information.

[25] SSFM International, *Lihue Community Plan*, Chapter 4, "Future Land Use: Growth and Development," June 2015.

[26] Gary Siracusa, Director of Construction, Timbers Resorts Kauai, "Proposed Development Plans for LIH NEM Update," email to Ricondo & Associates, Inc. Staff, November 11, 2021.

[27] Timbers Resorts, Belles Graham, LLP, Wilson Okamoto Corporation, *Hokuala Resort – Subdivisions 1 and 1A Petition for County Zoning Amendment*, June 2021.



SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvement – Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads).

EXHIBIT 2.5-3

OFF-AIRPORT FUTURE DEVELOPMENTS

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2.7 NOISE MODEL INPUT

As described in Section 1.3.1, operations, fleet mix, time-of-day distributions, runway use, noise model track locations and use, and aircraft performance characteristics are needed to calculate noise exposure patterns for the Airport. The following subsections summarize the noise model input to develop the 2019 Existing Condition and 2027 Forecast Conditions NEMs.

2.7.1 OPERATION LEVELS

The following subsections summarize the aircraft operational data used to develop the NEMs.

2.7.1.1 AIRCRAFT ACTIVITY LEVELS

Available operations data for the entire year of 2019 and an operations forecast for the year 2027 were used to develop aircraft activity levels for the development of the 2019 Existing Condition and 2027 Forecast Conditions NEMs. The annual aircraft activity forecasts for the NEMs were based on the forecast of aviation activity developed for the Master Plan Update, which was approved by the FAA on September 30, 2020 (see **Appendix B.2**). The FAA also approved the use of the Master Plan forecast for the Part 150 NEM Update study in the letter dated January 21, 2022 (see Appendix B.1). The Master Plan Forecast was analyzed to provide the additional inputs for planning, which also provide the required input for the AEDT. The following subsections summarize the operation levels modeled.

2.7.1.2 ACTUAL 2019 AND FORECAST 2027 ANNUAL AIRCRAFT OPERATIONS

The actual number of annual aircraft operations for 2019 and the number of operations forecast for 2027 were used for the NEM analysis; 126,833 total (itinerant and local[28]) annual aircraft operations were recorded in 2019 by the LIH ATCT, and 145,377 total (itinerant and local) annual aircraft operations were forecast for 2027 based on the Master Plan Forecast. **Tables 2.7-1** and **2.7-2** present the annual aircraft operations for the various user categories for itinerant and local operations, respectively.

TABLE 2.7-1 ANNUAL AIRCRAFT ITINERANT OPERATIONS BY USER CATEGORY

USER CATEGORY	DEFINITION[1]	2019 ACTUAL[2]	2027 FORECAST[3]
Air Carrier	An aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds carrying passengers or cargo for hire or compensation.	27,246	33,919
Air Taxi	An aircraft designed to have a maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less carrying passengers or cargo for hire or compensation.	77,982	86,246
General Aviation	Takeoffs and landings of all civil aircraft, except those classified as air carriers or air taxis.	5,868	6,436
Military	All classes of military takeoffs and landings at FAA and FTC facilities.	1,677	1,797
Total		**112,773**	**128,398**

NOTES: FAA – Federal Aviation Administration FTC – Federal Contract Tower

1 Definitions obtained from the following webpage: https://aspm.faa.gov/aspmhelp/index/Glossary.html.

2 Represents historical annual operations for the calendar year reported by the FAA in the 2019 Distributed Operations Network report for the LIH Airport Traffic Control Tower.

3 Represents annual operations from the *Lihue Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*.

SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); US Department of Transportation, Federal Aviation Administration, *Aviation Forecast Approval – Lihue Master Plan*, September 30, 2020; Ricondo & Associates, Inc., March 2021 (analysis).

[28] Itinerant operations refer to aircraft that arrive from outside the airport area and depart the airport area. Local operations refer to aircraft that remain in the local traffic pattern and conduct simulated instrument approaches, touch-and-go operations, or designated practice generally within a 20-mile radius of the ATCT.

TABLE 2.7-2 ANNUAL AIRCRAFT LOCAL OPERATIONS BY USER CATEGORY

USER CATEGORY[1]	2019 ACTUAL[2]	2027 FORECAST[3]
General Aviation	13,572	16,558
Military	488	421
Total	**14,060**	**16,979**

NOTES:
1 No air carrier or air taxi local operations occurred at the Airport in 2019 and none are forecast for 2027.
2 Represents historical annual operations for the calendar year reported by the Federal Aviation Administration in the 2019 Distributed Operations Network report for the LIH Airport Traffic Control Tower.
3 Represents annual operations from the *Lihue Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*.
SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); US Department of Transportation, Federal Aviation Administration, *Aviation Forecast Approval – Lihue Master Plan*, September 30, 2020; Ricondo & Associates, Inc., March 2021 (analysis).

2.7.2 AIRCRAFT FLEET MIX AND TIME-OF-DAY DISTRIBUTION

The AAD[29] aircraft operations were split into the various aircraft type categories and then specific aircraft types for input to the AEDT. They were also split by time of day, with operations occurring between 7:00 a.m. and 9:59 p.m. defined as "day," and operations occurring between 10:00 p.m. and 6:59 a.m. defined as "night," as required for the calculation of DNL. Noise events occurring during the night hours are assigned a penalty of 10 decibels. In the calculation of DNL, one night operation with this penalty applied is equivalent to 10 daytime operations.

All air carrier operations are fixed-wing aircraft. Based on input from the LIH ATCT, 80 percent of air taxi and 70 percent of itinerant general aviation operations are helicopters. The remaining within each category are fixed-wing aircraft. For local general aviation operations, LIH ATCT indicated 40 percent are helicopters and the remaining 60 percent are fixed-wing aircraft.[30]

The air carrier and air taxi fixed-wing fleet mix proportion for 2019 was based on published airline flight schedules. There are some air cargo operations that are not scheduled; therefore, US DOT T-100[31] data were referenced to identify aircraft types that meet the air carrier definition and were used by cargo carriers. For 2027, the forecast design day flight schedules developed for the Master Plan Update were used. The forecast design day flight schedules include consideration of future aircraft orders, as well as expected airline retirements of older aircraft, in the development of the forecast fleet mix.

FAA TFMSC data for 2019 that provide aircraft-type operations for flights that filed an instrument flight rules (IFR) procedure were referenced to develop a generalized fleet mix for fixed-wing general aviation and military operations for both itinerant and local movements.

Helicopter operations for air taxi and general aviation were proportioned based on the types of helicopters based at LIH, which were confirmed based on the internet survey information. Military helicopter types were based on FAA TFMSC data for 2019. The type and proportion of helicopters for 2027 for air taxi, general aviation, and military were held constant from 2019 proportions.

Airline flight schedule data and FAA's Distributed OPSNET data for 2019 were applied to develop time-of-day distributions for 2019 scheduled operations for air carrier and air taxi fixed-wing operations. The FAA's Distributed

29 AAD is calculated by dividing the annual operations by 365 days.

30 Mark Heintzleman, Air Traffic Manager, Lihue Federal Contract Tower, "LIH Helicopters," email to Ricondo & Associates, Inc. Staff, November 6, 2020.

31 US Department of Transportation, Air Carrier Statistics (T-100)

OPSNET data for 2019 were used to determine the proportion of general aviation and military fixed-wing operations by time of day. The time-of-day proportions for 2019 local operations for general aviation and military were based on a previous assessment conducted for the *Lihue Airport Runway3-21 Safety Area EA*. The time-of-day distributions for helicopter operations were based on previous 14 CFR Part 150 analysis and confirmed by Technical Advisory Committee (TAC) members associated with helicopter operations at LIH.[32] **Tables 2.7-3** and **2.7-4** present the AAD aircraft operations by aircraft type and time of day for 2019 for itinerant and local operations, respectively.

For scheduled air carrier and air taxi fixed-wing operations, the time-of-day distributions for 2027 were based on the forecast design day flight schedules developed for the Master Plan Update. The 2019 time-of-day distributions for itinerant general aviation fixed-wing and helicopter, air taxi helicopter, itinerant military fixed-wing and helicopter, local general aviation fixed-wing and helicopter, and local military fixed-wing and helicopter operations were maintained for 2027. **Tables 2.7-5** and **2.7-6** present the AAD aircraft operations by aircraft type and time of day for 2027 for itinerant and local operations, respectively. Note that all aircraft types are based on standard aircraft or an FAA-approved substitution available in the AEDT. There was no need to seek FAA Office of Environment and Energy (AEE) approval for custom aircraft substitutions.

2.7.3 RUNWAY USE

Two types of primary wind conditions occur at LIH: trade wind and Kona wind. During trade wind conditions, Runway 35 is the primary arrival runway, and Runway 3 is the primary departure runway. During Kona wind conditions, Runway 21 is the primary arrival runway, and Runway 17 is the primary departure runway. Because of a mountain range on the extended Runway 3 centerline, air carrier aircraft cannot depart from Runway 21 or land on Runway 3. Only smaller propeller and turboprop aircraft can conduct such operations. Also, although Runways 3-21 and 17-35 are the same length, they do not result in equal aircraft performance. Runway 3 departures benefit from a runway downslope, increasing departure performance. Runways 17 and 35 departures do not have such an advantage. These conditions will still be present with the Runway 3-21 RSA improvements implemented. LIH also has secondary runway operating configurations. **Table 2.7-7** summarizes the runway operating configurations, which are depicted on **Exhibit 2.7-1**.

Use of each runway end for arrivals and departures was based on a wind analysis using NOAA data from January 1, 2009, to December 31, 2018, at LIH, and the data were compared to previous 14 CFR Part 150 assessments and the noise analysis for the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final EA*. Consultation with DOT-A and LIH ATCT was conducted to confirm the runway-use assumptions reasonably represent 2019 conditions.[33] **Tables 2.7-8** through **2.7-10** present the itinerant arrival, itinerant departure, and local runway use percentages by aircraft category for daytime and nighttime operations for each runway end, respectively. It was assumed that the RSA improvements will not result in a change to the runway use percentages; therefore, the runway use modeled for 2019 would remain constant for the 2027 forecast conditions. This is consistent with the assumptions applied for the Proposed Action evaluated in the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final EA*.[34]

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[32] See Appendix C for the meeting notes for the LIH NEM Update TAC Meeting #1 held on October 25, 2021.

[33] Mark Heintzleman, Air Traffic Manager, Lihue Federal Contract Tower, “Confirm Flight Track Data with LIH ATCT,” email to Ricondo & Associates, Inc. Staff, November 12, 2020.

[34] State of Hawaii, Department of Transportation – Airports Division, *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final Environmental Assessment – Appendices*, March 2018, p. C-25.

TABLE 2.7-3 ITINERANT AVERAGE ANNUAL DAY OPERATIONS BY AIRCRAFT TYPE AND TIME OF DAY – 2019 EXISTING CONDITION

REPRESENTATIVE AIRCRAFT	ARRIVAL			DEPARTURE			TOTAL
	DAY [4]	NIGHT [5]	TOTAL	DAY [4]	NIGHT [5]	TOTAL	
Heavy Jet [1]							
757PW	2.27	0.00	2.27	1.93	0.34	2.27	4.54
757RR	0.97	0.00	0.97	0.83	0.15	0.97	1.95
767-300	0.00	0.09	0.09	0.02	0.07	0.09	0.18
Heavy Jet Total [6]	**3.24**	**0.09**	**3.34**	**2.78**	**0.56**	**3.34**	**6.67**
Large Jets [2]							
717-200	18.98	3.89	22.86	19.04	3.83	22.86	45.73
737-300	1.77	0.61	2.39	1.91	0.48	2.39	4.77
737-800	6.18	2.14	8.31	6.65	1.66	8.31	16.63
737-800 Max	0.06	0.02	0.09	0.07	0.02	0.09	0.17
A321-200	3.26	0.60	3.86	3.26	0.60	3.86	7.72
Small Jets [3]							
CL601	1.00	0.37	1.37	0.90	0.47	1.37	2.74
GIV	2.60	0.97	3.57	2.34	1.23	3.57	7.14
GV	1.22	0.46	1.68	1.10	0.58	1.68	3.36
Large and Small Jets Total [6]	**35.07**	**9.06**	**44.14**	**35.27**	**8.87**	**44.14**	**88.27**
Piston and Turboprop							
DHC6	4.61	1.72	6.33	4.63	1.71	6.33	12.67
CNA208	7.53	2.81	10.35	7.56	2.79	10.35	20.70
AT72-212A	0.00	0.77	0.77	0.00	0.77	0.77	1.54
PA31	0.69	0.26	0.94	0.67	0.28	0.94	1.89
SD330	0.80	0.30	1.10	0.85	0.25	1.10	2.19
Piston and Turboprop Total [6]	**13.63**	**5.86**	**19.49**	**13.70**	**5.80**	**19.49**	**38.99**
Military [7]							
C130E	0.59	0.20	0.79	0.68	0.11	0.79	1.58
C17	0.25	0.08	0.33	0.28	0.05	0.33	0.66
F18	0.19	0.06	0.25	0.21	0.03	0.25	0.49
P3A	0.70	0.23	0.93	0.80	0.13	0.93	1.85
Military Total [6]	**1.72**	**0.57**	**2.29**	**1.97**	**0.32**	**2.29**	**4.59**
Helicopter							
EC130	27.99	0.87	28.86	27.99	0.87	28.86	57.72
H500D	12.44	0.38	12.83	12.44	0.38	12.83	25.65
R22	3.11	0.10	3.21	3.11	0.10	3.21	6.41
R44	6.22	0.19	6.41	6.22	0.19	6.41	12.83
S70	1.85	0.00	1.85	1.85	0.00	1.85	3.71
SA350D	31.11	0.96	32.06	31.11	0.96	32.06	64.12
Helicopter Total [6]	**82.73**	**2.50**	**85.22**	**82.73**	**2.50**	**85.22**	**170.45**
TOTAL ITINERANT OPERATIONS [6]	**136.39**	**18.09**	**154.48**	**136.44**	**18.04**	**154.48**	**308.97**

NOTES:

1 Heavy Jet – aircraft weighing more than 255,000 pounds
2 Large Jet – aircraft weighing more than 41,000 and up to 255,000 pounds
3 Small Jet – aircraft weighing less than 41,000 pounds
4 Day – 7:00 a.m. to 9:59 p.m.
5 Night – 10:00 p.m. to 6:59 a.m.
6 Totals may not add due to rounding.
7 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories.

SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment*, March 2018.

TABLE 2.7-4 LOCAL AVERAGE ANNUAL DAY OPERATIONS BY AIRCRAFT TYPE AND TIME OF DAY – 2019 EXISTING CONDITION

REPRESENTATIVE AIRCRAFT	ARRIVAL			DEPARTURE			TOTAL
	DAY [2]	NIGHT [3]	TOTAL	DAY [2]	NIGHT [3]	TOTAL	
General Aviation Jet[1]							
CL601	0.10	0.06	0.15	0.10	0.06	0.15	0.31
CNA500	0.28	0.16	0.44	0.28	0.16	0.44	0.88
CNA750	0.07	0.04	0.12	0.07	0.04	0.12	0.24
GIV	0.69	0.33	1.02	0.69	0.33	1.02	2.04
GV	0.32	0.17	0.49	0.32	0.17	0.49	0.99
General Aviation Jet Total [4]	**1.46**	**0.76**	**2.22**	**1.46**	**0.76**	**2.22**	**4.45**
Piston and Turboprop							
BEC58P	0.54	0.32	0.86	0.54	0.32	0.86	1.72
CNA206	2.16	1.25	3.42	2.16	1.25	3.42	6.83
CNA441	0.86	0.50	1.36	0.86	0.50	1.36	2.72
DHC6	0.33	0.00	0.33	0.33	0.00	0.33	0.66
GASEPV	0.87	0.51	1.37	0.87	0.51	1.37	2.75
Piston and Turboprop Total [4]	**4.76**	**2.58**	**7.34**	**4.76**	**2.58**	**7.34**	**14.68**
Military [5]							
C130E	0.50	0.00	0.50	0.50	0.00	0.50	1.00
Military Total [4]	**0.50**	**0.00**	**0.50**	**0.50**	**0.00**	**0.50**	**1.00**
Helicopter							
EC130	3.02	0.09	3.11	3.02	0.09	3.11	6.22
H500D	1.34	0.04	1.38	1.34	0.04	1.38	2.76
R22	0.34	0.01	0.35	0.34	0.01	0.35	0.69
R44	0.67	0.02	0.69	0.67	0.02	0.69	1.38
S70	0.20	0.00	0.20	0.20	0.00	0.20	0.40
SA350D	3.35	0.10	3.46	3.35	0.10	3.46	6.91
Helicopter Total [4]	**8.92**	**0.27**	**9.19**	**8.92**	**0.27**	**9.18**	**18.37**
TOTAL LOCAL OPERATIONS [4]	**15.64**	**3.61**	**19.25**	**15.64**	**3.61**	**19.25**	**38.50**

NOTES:

1 General Aviation Jet – non-commercial jet aircraft

2 Day – 7:00 a.m. to 9:59 p.m.

3 Night – 10:00 p.m. to 6:59 a.m.

4 Totals may not add due to rounding.

5 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories.

SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment*, March 2018.

TABLE 2.7-5 ITINERANT AVERAGE ANNUAL DAY OPERATIONS BY AIRCRAFT TYPE AND TIME OF DAY – 2027 FORECAST CONDITIONS

REPRESENTATIVE AIRCRAFT [1]	ARRIVAL			DEPARTURE			TOTAL
	DAY [4]	NIGHT [5]	TOTAL	DAY [4]	NIGHT [5]	TOTAL	
Heavy Jet [1]							
757PW	1.19	0.00	1.19	1.01	0.18	1.19	2.38
757RR	0.50	0.00	0.50	0.42	0.08	0.50	1.00
767-300	0.00	0.11	0.11	0.02	0.09	0.11	0.22
A330-200	0.13	0.02	0.15	0.13	0.02	0.15	0.30
787-8	0.04	0.01	0.05	0.04	0.01	0.05	0.10
Heavy Jet Total [6]	**1.86**	**0.14**	**2.00**	**1.63**	**0.37**	**2.00**	**4.00**
Large Jets [2]							
717-200	20.25	4.13	24.39	20.31	4.08	24.39	48.78
737-300	2.92	1.01	3.93	3.14	0.79	3.93	7.85
737-800	1.78	0.62	2.40	1.92	0.48	2.40	4.80
737-800 Max	6.20	2.14	8.34	6.68	1.66	8.34	16.69
A321-200	7.76	1.44	9.20	7.76	1.44	9.20	18.40
Small Jets [3]							
CL601	2.19	0.80	2.99	1.97	1.02	2.99	5.99
GIV	2.19	0.82	3.01	1.97	1.04	3.01	6.02
GV	1.02	0.38	1.40	0.92	0.48	1.40	2.79
Large and Small Jet Total [6]	**44.32**	**11.33**	**55.65**	**44.68**	**10.98**	**55.66**	**111.31**
Piston and Turboprop							
DHC6	6.14	2.30	8.44	6.16	2.28	8.44	16.88
CNA208	7.54	2.82	10.36	7.57	2.79	10.36	20.72
AT72-212A	0.00	1.55	1.55	0.00	1.55	1.55	3.09
PA31	0.75	0.28	1.03	0.73	0.30	1.03	2.06
SD330	0.90	0.34	1.24	0.95	0.28	1.24	2.47
Piston and Turboprop Total [6]	**15.34**	**7.27**	**22.61**	**15.41**	**7.20**	**22.61**	**45.22**
Military [7]							
C130E	0.62	0.21	0.83	0.71	0.12	0.83	1.65
C17	0.26	0.09	0.35	0.30	0.05	0.35	0.70
F18	0.21	0.07	0.29	0.25	0.04	0.29	0.57
P3A	0.75	0.25	1.00	0.86	0.14	1.00	2.00
Military Total [6]	**1.85**	**0.62**	**2.46**	**2.12**	**0.34**	**2.46**	**4.92**
Helicopter							
EC130	30.60	0.95	31.55	30.60	0.95	31.55	63.09
H500D	13.60	0.42	14.02	13.60	0.42	14.02	28.04
R22	3.40	0.11	3.51	3.40	0.11	3.51	7.01
R44	6.80	0.21	7.01	6.80	0.21	7.01	14.02
S70	2.03	0.00	2.03	2.03	0.00	2.03	4.05
SA350D	34.00	1.05	35.05	34.00	1.05	35.05	70.10
Helicopter Total [6]	**90.43**	**2.73**	**93.16**	**90.43**	**2.73**	**93.16**	**186.32**
TOTAL ITINERANT OPERATIONS [6]	**153.79**	**22.10**	**175.88**	**154.26**	**21.63**	**175.89**	**351.78**

NOTES:
1 Heavy Jet – aircraft weighing more than 255,000 pounds
2 Large Jet – aircraft weighing more than 41,000 and up to 255,000 pounds
3 Small Jet – aircraft weighing less than 41,000 pounds
4 Day – 7:00 a.m. to 9:59 p.m.
5 Night – 10:00 p.m. to 6:59 a.m.
6 Totals may not add due to rounding.
7 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories.

SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment*, March 2018.

TABLE 2.7-6 LOCAL AVERAGE ANNUAL DAY OPERATIONS BY AIRCRAFT TYPE AND TIME OF DAY – 2027 FORECAST CONDITIONS

REPRESENTATIVE AIRCRAFT	ARRIVAL			DEPARTURE			
	DAY [2]	NIGHT [3]	TOTAL	DAY [2]	NIGHT [3]	TOTAL	TOTAL
General Aviation Jet [1]							
CL601	0.12	0.07	0.18	0.12	0.07	0.18	0.37
CNA500	0.36	0.21	0.58	0.36	0.21	0.58	1.15
CNA750	0.09	0.05	0.14	0.09	0.05	0.14	0.28
GIV	0.86	0.41	1.28	0.86	0.41	1.28	2.55
GV	0.39	0.21	0.59	0.39	0.21	0.59	1.19
General Aviation Jet Total [4]	**1.82**	**0.96**	**2.77**	**1.82**	**0.96**	**2.77**	**5.54**
Piston and Turboprop							
BEC58P	0.65	0.38	1.03	0.65	0.38	1.03	2.06
CNA206	2.62	1.52	4.15	2.62	1.52	4.15	8.29
CNA441	1.03	0.60	1.63	1.03	0.60	1.63	3.27
DHC6	0.40	0.00	0.40	0.40	0.00	0.40	0.79
GASEPV	1.04	0.61	1.65	1.04	0.61	1.65	3.30
Piston and Turboprop Total [4]	**5.74**	**3.11**	**8.86**	**5.74**	**3.11**	**8.86**	**17.71**
Military [5]							
C130E	0.58	0.00	0.58	0.58	0.00	0.58	1.15
Military Total [4]	**0.58**	**0.00**	**0.58**	**0.58**	**0.00**	**0.58**	**1.15**
Helicopter							
EC130	3.63	0.11	3.74	3.63	0.11	3.74	7.49
H500D	1.61	0.05	1.66	1.61	0.05	1.66	3.33
R22	0.40	0.01	0.42	0.40	0.01	0.42	0.83
R44	0.81	0.02	0.83	0.81	0.02	0.83	1.66
S70	0.24	0.00	0.24	0.24	0.00	0.24	0.48
SA350D	4.03	0.12	4.16	4.03	0.12	4.16	8.32
Helicopter Total [4]	**10.73**	**0.32**	**11.06**	**10.73**	**0.32**	**11.06**	**22.11**
TOTAL LOCAL OPERATIONS [4]	**18.86**	**4.39**	**23.26**	**18.86**	**4.39**	**23.26**	**46.52**

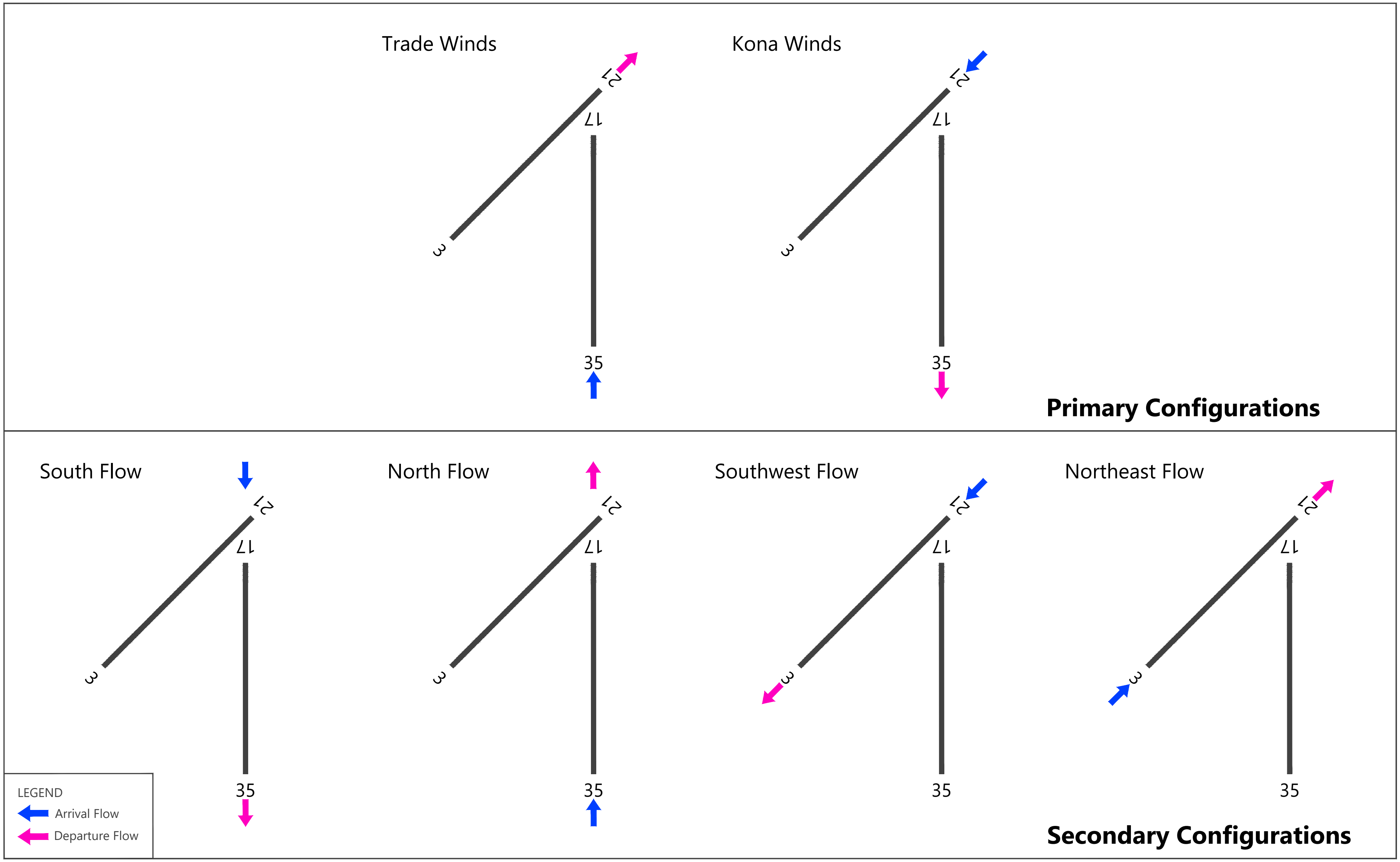
NOTES:
1 General Aviation Jet – non-commercial jet aircraft
2 Day – 7:00 a.m. to 9:59 p.m.
3 Night – 10:00 p.m. to 6:59 a.m.
4 Totals may not add due to rounding.
5 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories.

SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., L*ihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment*, March 2018.

TABLE 2.7-7 RUNWAY USE CONFIGURATIONS AND PERCENT WIND COVERAGE

CONFIGURATION	RUNWAYS USED	PERCENT OCCURRENCE
Trade Winds	Arrival: Runway 35; Departure: Runway 3	89.0%
Kona Winds	Arrival: Runway 21; Departure: Runway 17	7.4%
South Flow	Arrival: Runway 17; Departure: Runway 17	2.4%
North Flow	Arrival: Runway 35; Departure: Runway 35	1.0%
Southwest Flow	Arrival: Runway 21; Departure: Runway 21	0.1%
Northeast Flow	Arrival: Runway 3; Departure: Runway 3	0.1%

SOURCE: Ricondo & Associates, Inc., *Runway 3-21 Runway Safety Area Study*, February 2016.



SOURCES: Ricondo & Associates, Inc., May 2019 (based on National Oceanic and Atmospheric Administration, National Climatic Data Center, TD3505 Digital Data for Lihue Airport, Lihue, Hawaii, January 1, 2009 – December 31, 2018; 87,492 observations).

NORTH 0 Not To Scale

EXHIBIT 2.7-1

RUNWAY USE CONFIGURATION DIAGRAMS

Drawing: P:\project-chicago\Hawaii\LIH\07-master plan\2-NEM\2.4-NEM Documentation\Exhibits\CAD\Exhibit 2.7-1 Runway Use Configurations.dwgLayout: 2.7 Plotted: Jan 20, 2023, 02:13PM

TABLE 2.7-8 ITINERANT ARRIVAL RUNWAY USE PERCENTAGES – 2019 EXISTING AND 2027 FORECAST CONDITIONS

AIRCRAFT CATEGORY	RUNWAY				TOTAL
	3	21	17	35	
Daytime[1] Itinerant Arrivals					
Heavy Jet	0.0%	8.0%	2.0%	90.0%	100.0%
Large Jet	0.0%	8.0%	2.0%	90.0%	100.0%
Small Jet	0.1%	7.5%	2.4%	90.0%	100.0%
Military Aircraft[2]	0.0%	13.0%	0.0%	87.0%	100.0%
Propeller/Turboprop	0.1%	7.5%	2.4%	90.0%	100.0%
Daytime Itinerant Arrivals All Aircraft	**0.03%**	**8.0%**	**2.1%**	**89.9%**	**100.0%**
Nighttime[3] Itinerant Arrivals					
Heavy Jet	0.0%	8.0%	2.0%	90.0%	100.0%
Large Jet	0.0%	8.0%	2.0%	90.0%	100.0%
Small Jet	0.1%	7.5%	2.4%	90.0%	100.0%
Military Aircraft[2]	0.0%	13.0%	0.0%	87.0%	100.0%
Propeller/Turboprop	0.1%	7.5%	2.4%	90.0%	100.0%
Nighttime Itinerant Arrivals All Aircraft	**0.05%**	**7.9%**	**2.1%**	**89.9%**	**100.0%**
All Itinerant Arrivals	**0.05%**	**8.0%**	**2.1%**	**89.9%**	**100.0%**

NOTES:
1 Daytime – 7:00 a.m. to 9:59 p.m.
2 Civilian-type aircraft operated by military and government agencies are included in large jet, small jet, prop/turboprop, and helicopter categories.
3 Nighttime – 10:00 p.m. to 6:59 a.m.
SOURCES: State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative – LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

TABLE 2.7-9 ITINERANT DEPARTURE RUNWAY USE PERCENTAGES – 2019 EXISTING AND 2027 FORECAST CONDITIONS

AIRCRAFT CATEGORY	RUNWAY				TOTAL
	3	21	17	35	
Daytime[1] Itinerant Departures					
Heavy Jet	89.0%	0.0%	10.0%	1.0%	100.0%
Large Jet	89.0%	0.0%	10.0%	1.0%	100.0%
Small Jet	89.1%	0.1%	9.8%	1.0%	100.0%
Military Aircraft [2]	90.0%	0.0%	10.0%	0.0%	100.0%
Propeller/Turboprop	89.1%	0.1%	9.8%	1.0%	100.0%
Daytime Itinerant Departures All Aircraft	**89.1%**	**0.03%**	**9.9%**	**1.0%**	**100.0%**
Nighttime[3] Itinerant Departures					
Heavy Jet	89.0%	0.0%	10.0%	1.0%	100.0%
Large Jet	89.0%	0.0%	10.0%	1.0%	100.0%
Small Jet	89.1%	0.1%	9.8%	1.0%	100.0%
Military Aircraft[2]	90.0%	0.0%	10.0%	0.0%	100.0%
Propeller/Turboprop	89.1%	0.1%	9.8%	1.0%	100.0%
Nighttime Itinerant Departures All Aircraft	**89.1%**	**0.1%**	**9.9%**	**1.0%**	**100.0%**
All Itinerant Departures	**89.1%**	**0.1%**	**9.9%**	**1.0%**	**100.0%**

NOTES:
1 Daytime – 7:00 a.m. to 9:59 p.m.
2 Civilian-type aircraft operated by military and government agencies are included in large jet, small jet, prop/turboprop, and helicopter categories.
3 Nighttime – 10:00 p.m. to 6:59 a.m.
SOURCES: State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative – LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

TABLE 2.7-10 LOCAL RUNWAY USE PERCENTAGES – 2019 EXISTING AND 2027 FORECAST CONDITIONS

AIRCRAFT CATEGORY	RUNWAY				TOTAL
	3	21	17	35	
Daytime[1] Local Operations					
Military Aircraft[2]	0.0%	0.0%	13.0%	87.0%	100.0%
General Aviation	87.0%	13.0%	0.0%	0.0%	100.0%
Daytime Local Operations All Aircraft	**1.0%**	**12.0%**	**80.5%**	**6.5%**	**100.0%**
Nighttime[3] Local Operations					
Military Aircraft[2]	0.0%	0.0%	0.0%	0.0%	N/A
General Aviation	87.0%	13.0%	0.0%	0.0%	100.0%
Nighttime Local Operations All Aircraft	**87.0%**	**13.0%**	0.0%	0.0%	**100.0%**
All Local Operations	**0.6%**	**12.4%**	**82.7%**	**4.3%**	**100.0%**

NOTES:
1 Daytime – 7:00 a.m. to 9:59 p.m.
2 Civilian-type aircraft operated by military and government agencies are included in large jet, small jet, prop/turboprop, and helicopter categories.
3 Nighttime – 10:00 p.m. to 6:59 a.m.
SOURCES: State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management*, August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative – LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

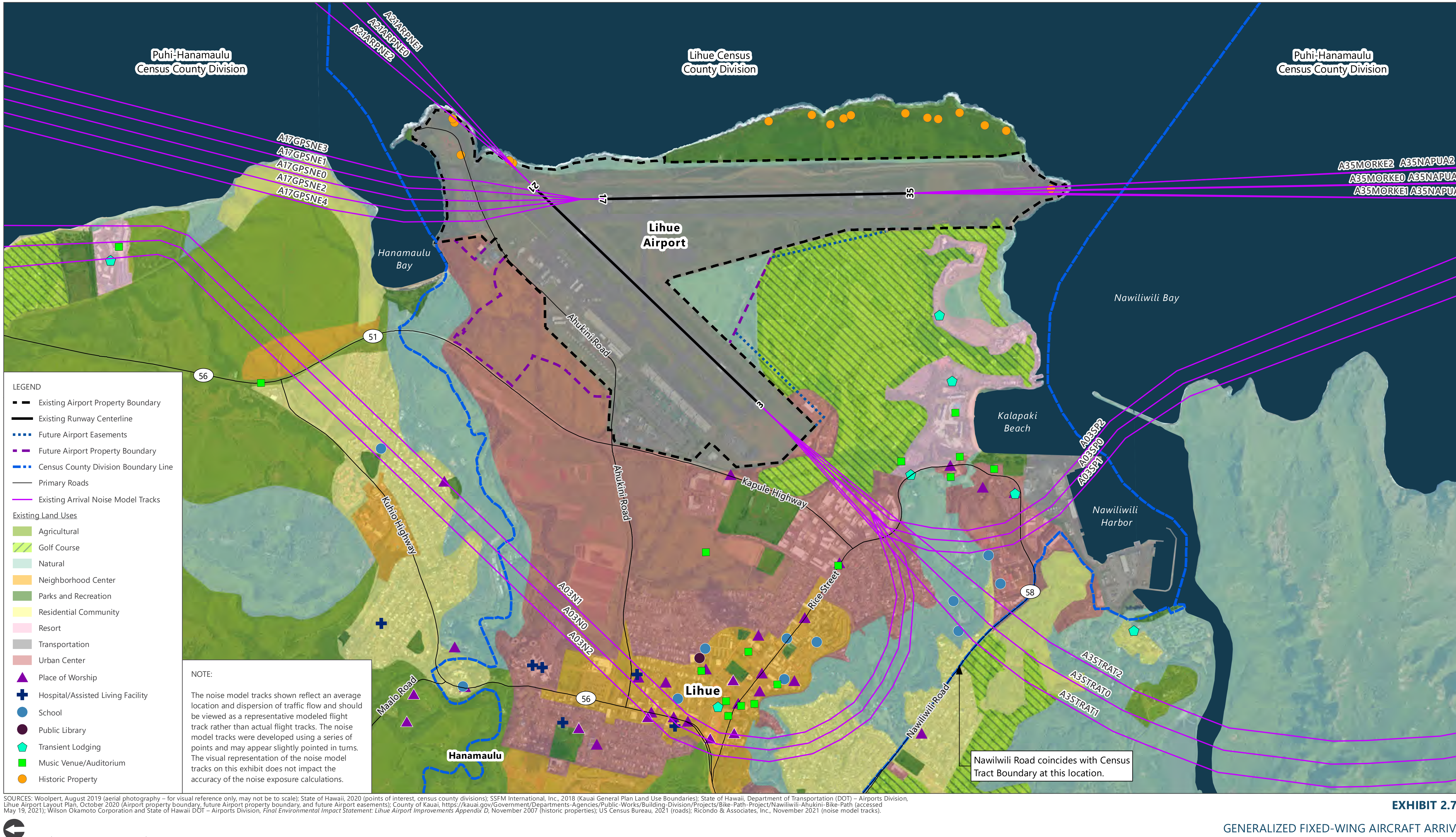
2.7.4 HELIPAD USE

As described in Section 2.2.1, three helipads are available for helicopter operations at LIH. Due to the proximity of the three helipads to each other, one was modeled in the AEDT. All helicopters were assigned to the central helipad for takeoff and landing in the AEDT. The direction to and from the helipad was based on the two primary runway operating configurations.

2.7.5 NOISE MODEL TRACK LOCATIONS AND USE

Generalized noise model tracks refer to the nominal flight paths aircraft follow when arriving to or departing from a runway or helipad at LIH and are required input to the AEDT. Because there are no radar data available, the noise model track development process began with the noise model tracks developed for the *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final EA* noise modeling analysis. Supplementary sources of information, such as the LIH ATCT standard operating procedures, were considered to determine if any of the noise model tracks required adjustments. The proposed noise model tracks and their use were reviewed by the LIH ATCT to confirm the noise model tracks reasonably represent 2019 conditions at LIH.[35] **Exhibits 2.7-2** to **2.7-5** present the arrival and departure noise model tracks for 2019 existing and 2027 forecast conditions itinerant fixed-wing aircraft. **Exhibit 2.7-6** presents the noise model tracks for general aviation and military touch-and-go operations for the 2019 existing condition. **Exhibit 2.7-7** depicts 2027 forecast conditions noise model tracks for general aviation and military touch-and-go operations. Finally, **Exhibit 2.7-8** presents helicopter itinerant (arrival/departure) and local (touch-and-go) noise model tracks, which are the same for both the 2019 existing and 2027 forecast conditions. **Tables 2.7-11** to **2.7-14** summarizes the allocation of operations to the noise model tracks shown on Exhibits 2.7-2 through 2.7-8.

[35] Mark Heintzleman, Air Traffic Manager, Lihue Federal Contract Tower, "Confirm Flight Track Data with LIH ATCT," email to Ricondo & Associates, Inc. Staff, November 12, 2020.



SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., November 2021 (noise model tracks).

EXHIBIT 2.7-2

GENERALIZED FIXED-WING AIRCRAFT ARRIVAL NOISE MODEL TRACKS – 2019 EXISTING CONDITION

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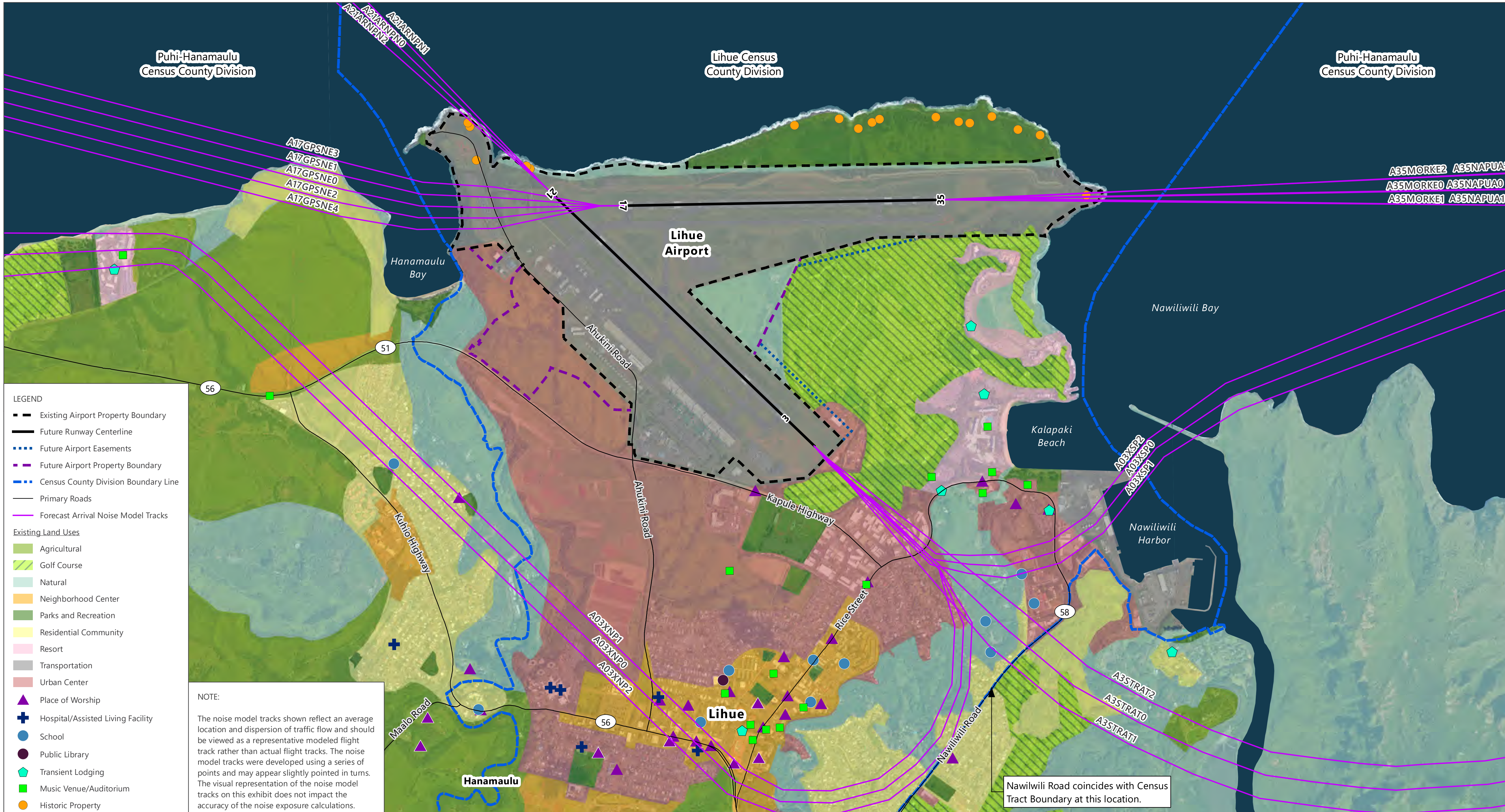

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., November 2021 (noise model tracks).

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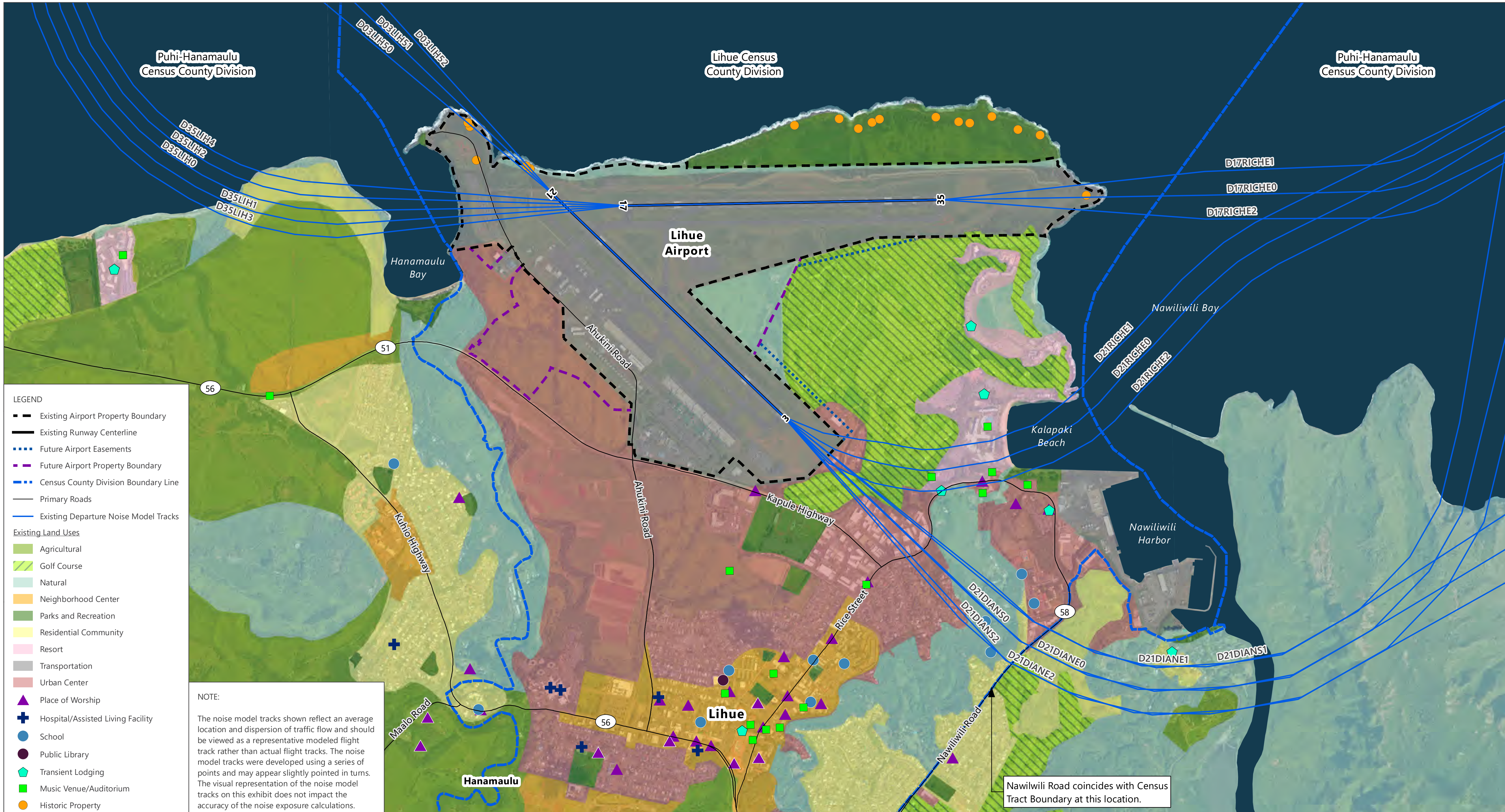
EXHIBIT 2.7-3

GENERALIZED FIXED-WING AIRCRAFT ARRIVAL
NOISE MODEL TRACKS – 2027 FORECAST CONDITONS

P:\GIS\Projects\LIH\MXD\LIH_NEM_Exh2-7_3_2027ForecastConditionsGeneralizedFixedWingAircraftArrivalNoiseModelTracks_20230120.mxd



SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., November 2021 (noise model tracks).

NORTH

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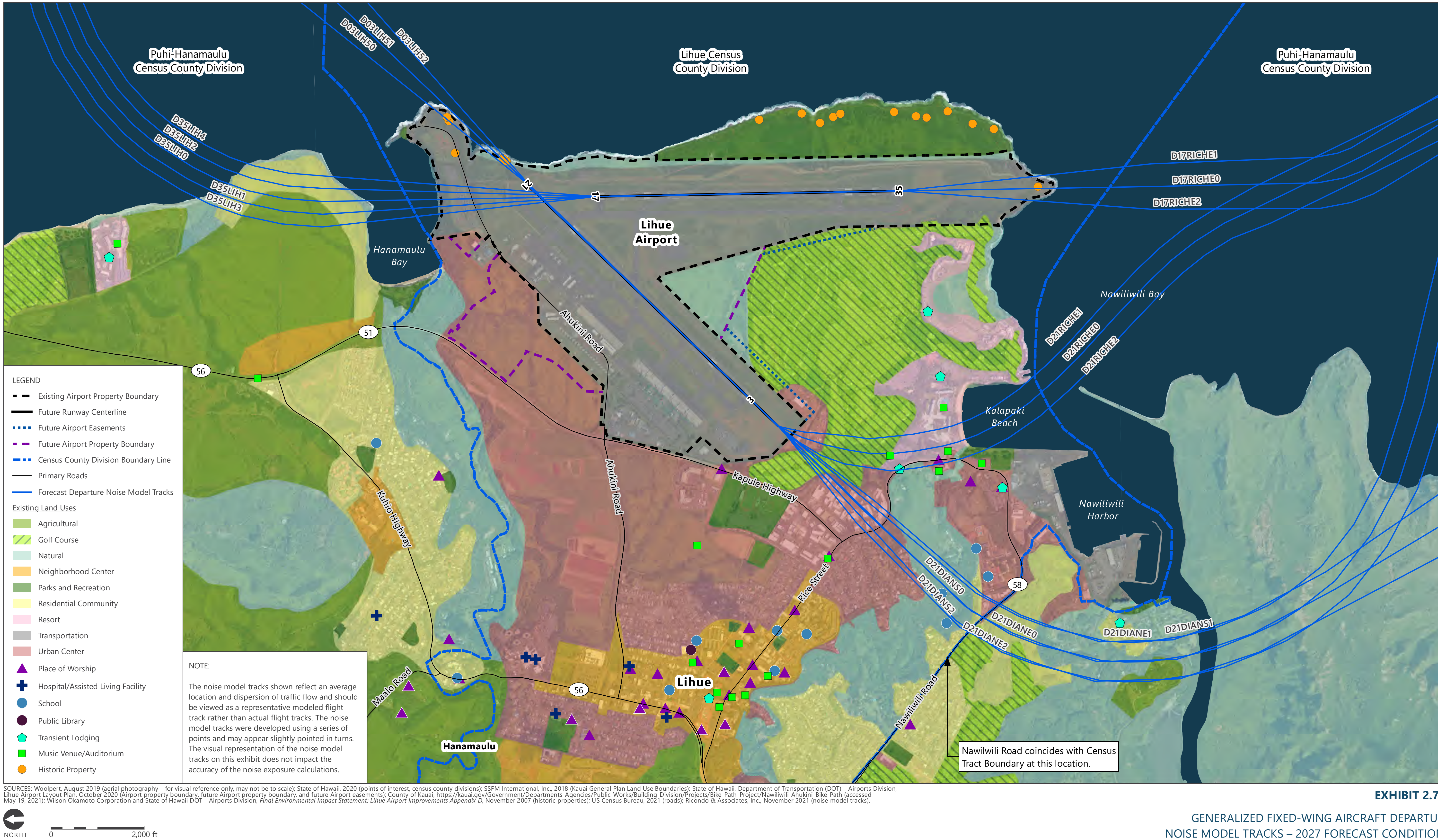
EXHIBIT 2.7-4

GENERALIZED FIXED-WING AIRCRAFT DEPARTURE NOISE MODEL TRACKS – 2019 EXISTING CONDITION

P:\GIS\Projects\LIH\MXD\LIH_NEM_Exh2-7_4_2019ExistingConditionGeneralizedFixedWingAircraftDepartureNoiseModelTracks_20230120.mxd

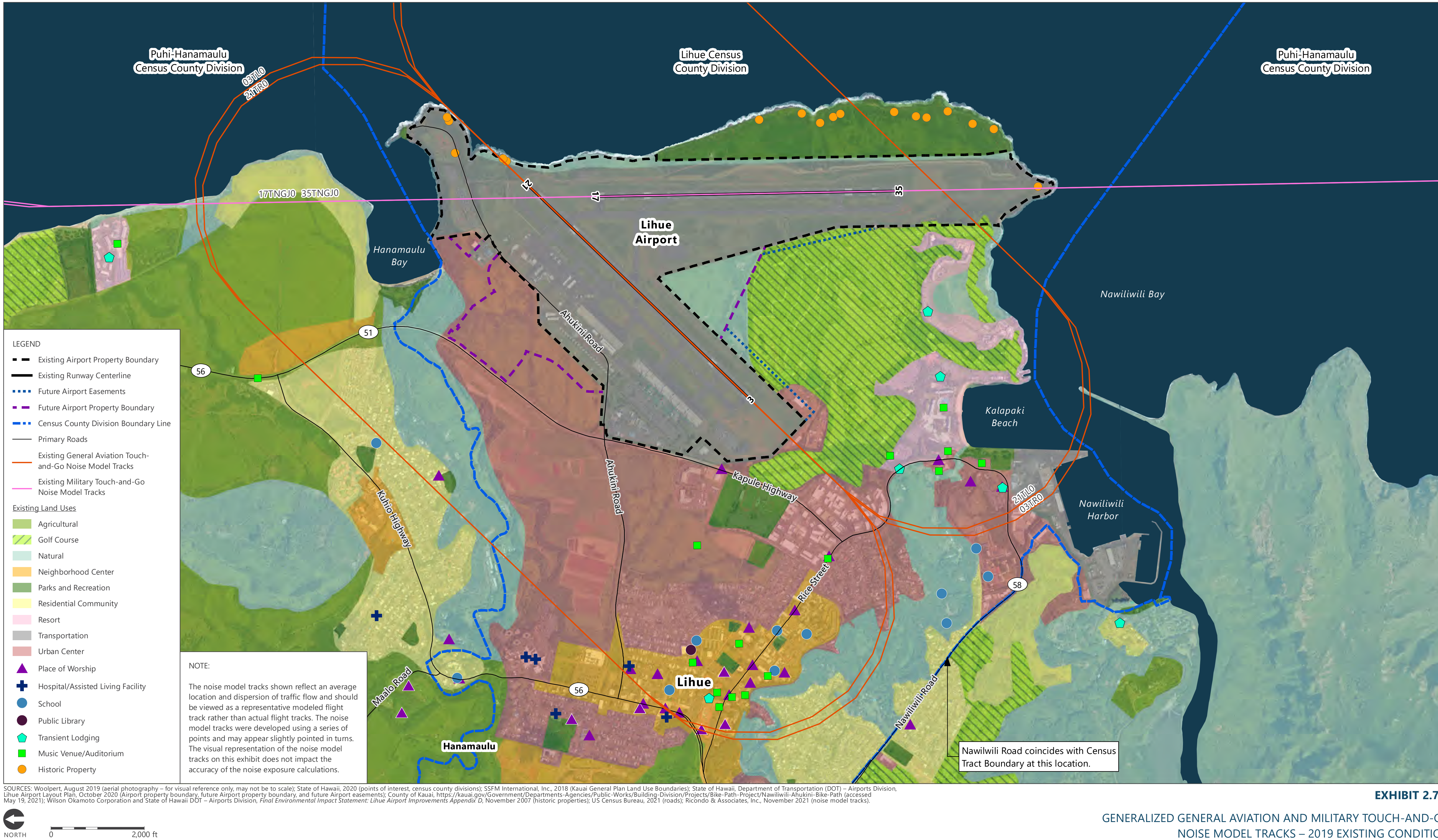


SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., November 2021 (noise model tracks).

EXHIBIT 2.7-5

GENERALIZED FIXED-WING AIRCRAFT DEPARTURE NOISE MODEL TRACKS – 2027 FORECAST CONDITIONS

P:\GIS\Projects\LIH\MXD\LIH_NEM_Exh2-7_5_2027ForecastConditionsGeneralizedFixedWingAircraftDepartureNoiseModelTracks_20230120.mxd

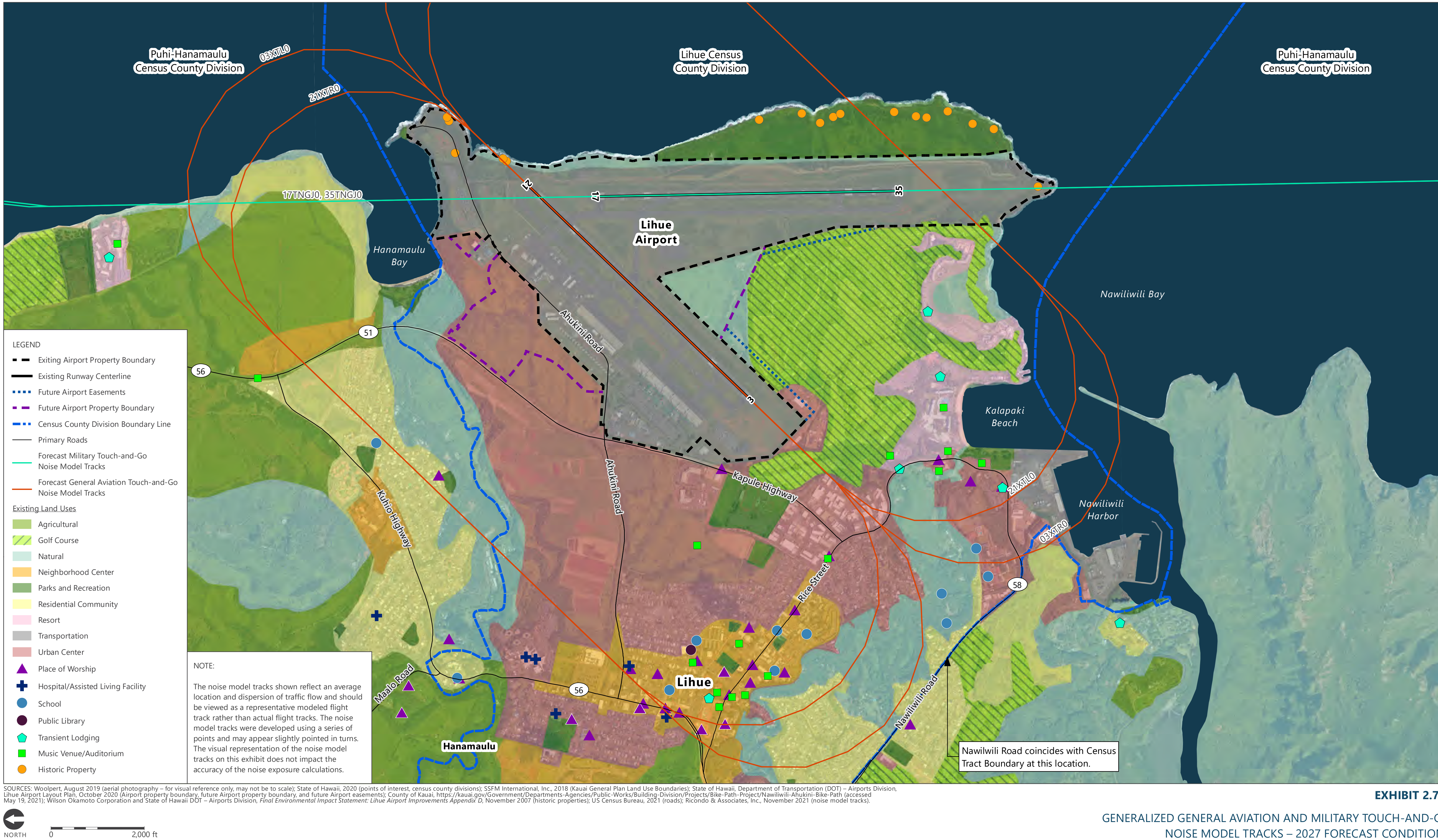


SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., November 2021 (noise model tracks).

EXHIBIT 2.7-6

GENERALIZED GENERAL AVIATION AND MILITARY TOUCH-AND-GO NOISE MODEL TRACKS – 2019 EXISTING CONDITION

P:\GIS\Projects\LIH\MXD\LIH_NEM_Exh2-7_6_2019ExistingConditionGeneralizedFixedWingMilitaryTouch-And-GoNoiseModelTracks_20230120.mxd



NOTE:

The noise model tracks shown reflect an average location and dispersion of traffic flow and should be viewed as a representative modeled flight track rather than actual flight tracks. The noise model tracks were developed using a series of points and may appear slightly pointed in turns. The visual representation of the noise model tracks on this exhibit does not impact the accuracy of the noise exposure calculations.

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., November 2021 (noise model tracks).

EXHIBIT 2.7-7

GENERALIZED GENERAL AVIATION AND MILITARY TOUCH-AND-GO NOISE MODEL TRACKS – 2027 FORECAST CONDITIONS

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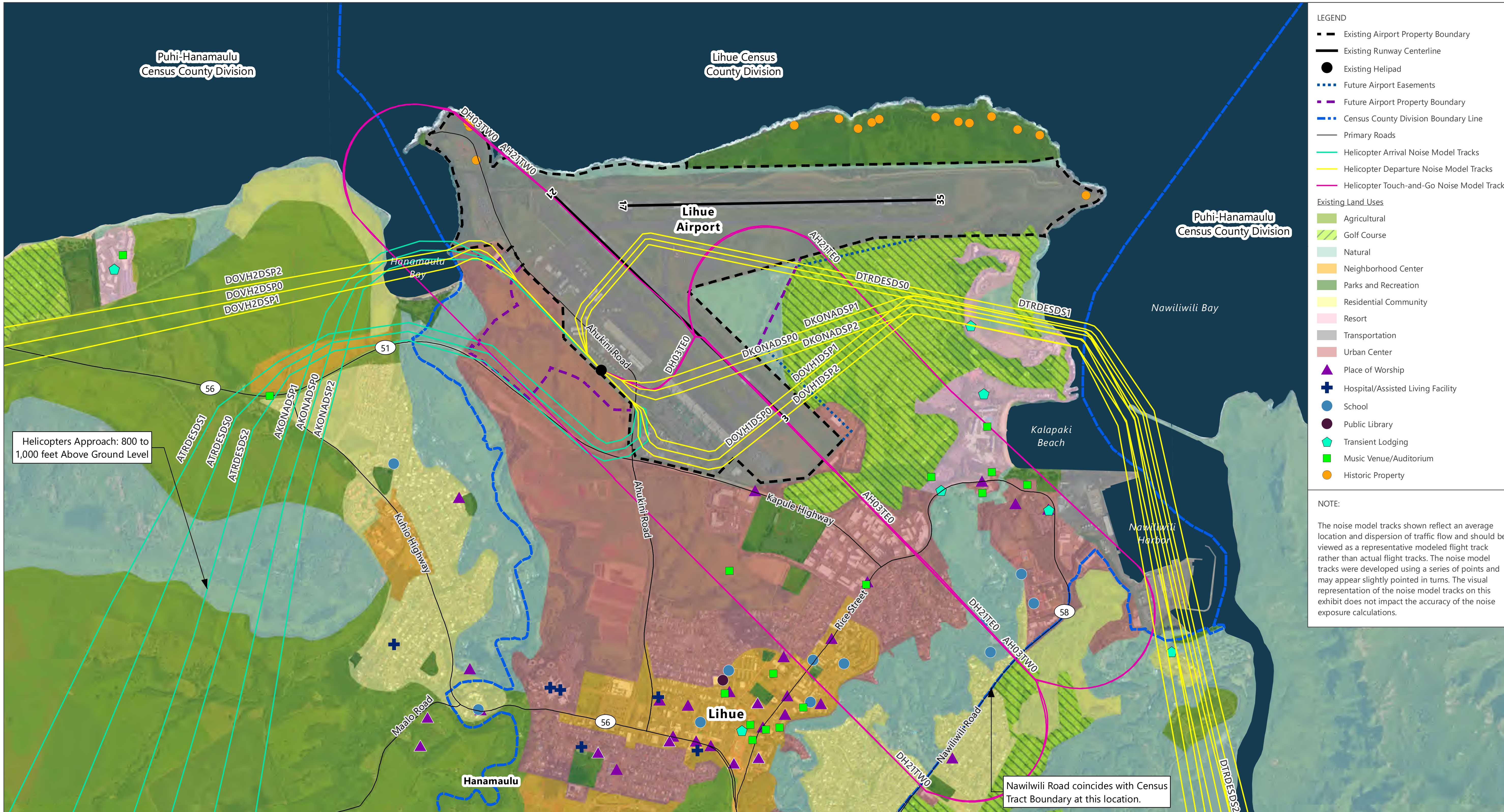

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., November 2021 (noise model tracks).

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EXHIBIT 2.7-8

GENERALIZED HELICOPTER ARRIVAL, DEPARTURE, AND TOUCH-AND-GO NOISE MODEL TRACKS – 2019 EXISTING AND 2027 FORECAST CONDITIONS

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TABLE 2.7-11 GENERALIZED FIXED-WING NOISE MODEL TRACK USE – 2019 EXISTING CONDITION

ARRIVALS				DEPARTURES			
RUNWAY	TRACK ID	DAY	NIGHT	RUNWAY	TRACK ID	DAY	NIGHT
17	A17GPSNE0	38.60%	38.60%	17	D17RICHE0	68.26%	68.26%
	A17GPSNE1	24.40%	24.40%		D17RICHE1	15.87%	15.87%
	A17GPSNE2	24.40%	24.40%		D17RICHE2	15.87%	15.87%
	A17GPSNE3	6.30%	6.30%		**TOTAL**	**100.00%**	**100.00%**
	A17GPSNE4	6.30%	6.30%	35	D35LIH0	38.60%	38.60%
	TOTAL	**100.00%**	**100.00%**		D35LIH1	24.40%	24.40%
35	A35MORKE0	34.13%	34.13%		D35LIH2	24.40%	24.40%
	A35MORKE1	7.93%	7.93%		D35LIH3	6.30%	6.30%
	A35MORKE2	7.93%	7.93%		D35LIH4	6.30%	6.30%
	A35NAPUA0	34.13%	34.13%		**TOTAL**	**100.00%**	**100.00%**
	A35NAPUA1	7.93%	7.93%	3	D03LIH50	68.26%	68.26%
	A35NAPUA2	7.93%	7.93%		D03LIH51	15.87%	15.87%
	TOTAL	**100.00%**	**100.00%**		D03LIH52	15.87%	15.87%
3	A03N0	25.21%	26.10%		**TOTAL**	**100.00%**	**100.00%**
	A03N1	5.86%	6.07%	21	D21DIANE0	21.17%	21.88%
	A03N2	5.86%	6.07%		D21DIANE1	4.92%	5.09%
	A03SP0	25.21%	26.10%		D21DIANE2	4.92%	5.09%
	A03SP1	5.86%	6.07%		D21DIANS0	8.22%	9.63%
	A03SP2	5.86%	6.07%		D21DIANS1	1.91%	2.24%
	A3STRAT0	17.84%	16.05%		D21DIANS2	1.91%	2.24%
	A3STRAT1	4.15%	3.73%		D21RICHE0	38.86%	36.75%
	A3STRAT2	4.15%	3.73%		D21RICHE1	9.03%	8.54%
	TOTAL	**100.00%**	**100.00%**		D21RICHE2	9.03%	8.54%
21	A21ARPNE0	68.26%	68.26%		**TOTAL**	**100.00%**	**100.00%**
	A21ARPNE1	15.87%	15.87%				
	A21ARPNE2	15.87%	15.87%				
	TOTAL	**100.00%**	**100.00%**				

NOTES:
Noise model tracks shown on Exhibits 2.7-2 and 2.7-4.
Totals may not add due to rounding.
SOURCES: US Department of Transportation, Federal Aviation Administration, Aviation Environmental Tool (AEDT) Version 3d; Ricondo & Associates, Inc., October 2021.

TABLE 2.7-12 GENERALIZED FIXED-WING NOISE MODEL TRACK USE – 2027 FORECAST CONDITIONS

ARRIVALS				DEPARTURES			
RUNWAY	TRACK ID	DAY	NIGHT	RUNWAY	TRACK ID	DAY	NIGHT
17	A17GPSNE0	38.60%	38.60%	**17**	D17RICHE0	68.26%	68.26%
	A17GPSNE1	24.40%	24.40%		D17RICHE1	15.87%	15.87%
	A17GPSNE2	24.40%	24.40%		D17RICHE2	15.87%	15.87%
	A17GPSNE3	6.30%	6.30%		**TOTAL**	**100.00%**	**100.00%**
	A17GPSNE4	6.30%	6.30%	**35**	D35LIH0	38.60%	38.60%
	TOTAL	**100.00%**	**100.00%**		D35LIH1	24.40%	24.40%
35	A35MORKE0	34.13%	34.13%		D35LIH2	24.40%	24.40%
	A35MORKE1	7.93%	7.93%		D35LIH3	6.30%	6.30%
	A35MORKE2	7.93%	7.93%		D35LIH4	6.30%	6.30%
	A35NAPUA0	34.13%	34.13%		**TOTAL**	**100.00%**	**100.00%**
	A35NAPUA1	7.93%	7.93%	**3**	D3DLIH50	68.26%	68.26%
	A35NAPUA2	7.93%	7.93%		D3DLIH51	15.87%	15.87%
	TOTAL	**100.00%**	**100.00%**		D3DLIH52	15.87%	15.87%
3	A03XNP0	25.24%	26.77%		**TOTAL**	**100.00%**	**100.00%**
	A03XNP1	5.87%	6.22%	**21**	D21DIANE0	21.16%	21.50%
	A03XNP2	5.87%	6.22%		D21DIANE1	4.92%	5.00%
	A03XSP0	25.24%	26.77%		D21DIANE2	4.92%	5.00%
	A03XSP1	5.87%	6.22%		D21DIANS0	8.19%	8.89%
	A03XSP2	5.87%	6.22%		D21DIANS1	1.90%	2.07%
	A3STRAT0	17.77%	14.72%		D21DIANS2	1.90%	2.07%
	A3STRAT1	4.13%	3.42%		D21RICHE0	38.92%	37.87%
	A3STRAT2	4.13%	3.42%		D21RICHE1	9.05%	8.80%
	TOTAL	**100.00%**	**100.00%**		D21RICHE2	9.05%	8.80%
21	A21ARNPN0	68.26%	68.26%		**TOTAL**	**100.00%**	**100.00%**
	A21ARNPN1	15.87%	15.87%				
	A21ARNPN2	15.87%	15.87%				
	TOTAL	**100.00%**	**100.00%**				

NOTES:
Noise model tracks shown on Exhibits 2.7-3 and 2.7-5.
Totals may not add due to rounding.
SOURCES: US Department of Transportation, Federal Aviation Administration, Aviation Environmental Tool (AEDT) Version 3d; Ricondo & Associates, Inc., October 2021.

TABLE 2.7-13 GENERAL AVIATION AND MILITARY TOUCH-AND-GO NOISE MODEL TRACK USE – 2019 EXISTING AND 2027 FORECAST CONDITIONS

EXISTING (2019)				FORECAST (2027)			
RUNWAY	TRACK ID	DAY	NIGHT	RUNWAY	TRACK ID	DAY	NIGHT
17	17TNGJ0	100.00%	0.00%	17	17TNGJ0	100.00%	0.00%
	TOTAL	**100.00%**	**0.00%**		**TOTAL**	**100.00%**	**0.00%**
35	35TNGJ0	100.00%	0.00%	35	35TNGJ0	100.00%	0.00%
	TOTAL	**100.00%**	**0.00%**		**TOTAL**	**100.00%**	**0.00%**
3	03TL0	50.00%	50.00%	3	03XTL0	50.00%	50.00%
	03TR0	50.00%	50.00%		03XTR0	50.00%	50.00%
	TOTAL	**100.00%**	**100.00%**		**TOTAL**	**100.00%**	**100.00%**
21	21TL0	50.00%	50.00%	21	21XTL0	50.00%	50.00%
	21TR0	50.00%	50.00%		21XTR0	50.00%	50.00%
	TOTAL	**100.00%**	**100.00%**		**TOTAL**	**100.00%**	**100.00%**

NOTE: Noise model tracks shown on Exhibits 2.7-6 and 2.7-7.
SOURCES: US Department of Transportation, Federal Aviation Administration, Aviation Environmental Tool (AEDT) Version 3d; Ricondo & Associates, Inc., October 2021.

TABLE 2.7-14 GENERALIZED HELICOPTER NOISE MODEL TRACK USE – 2019 EXISTING AND 2027 FORECAST CONDITIONS

ARRIVALS			DEPARTURES			TOUCH-AND-GO		
TRACK ID	DAY	NIGHT	TRACK ID	DAY	NIGHT	TRACK ID	DAY	NIGHT
AKONADSP0	4.34%	4.34%	DKONADSP0	3.34%	0.00%	AH03TE0	21.75%	21.75%
AKONADSP1	4.33%	4.33%	DKONADSP1	3.33%	0.00%	AH03TW0	21.75%	21.75%
AKONADSP2	4.33%	4.33%	DKONADSP2	3.33%	0.00%	AH21TE0	3.25%	3.25%
ATRDESDS0	29.06%	29.06%	DOVH1DSP0	1.10%	0.00%	AH21TW0	3.25%	3.25%
ATRDESDS1	28.97%	28.97%	DOVH1DSP1	1.10%	0.00%	DH03TE0	21.75%	21.75%
ATRDESDS2	28.97%	28.97%	DOVH1DSP2	1.10%	0.00%	DH03TW0	21.75%	21.75%
TOTAL	**100.00%**	**100.00%**	DOVH2DSP0	0.33%	0.00%	DH21TE0	3.25%	3.25%
			DOVH2DSP1	0.33%	0.00%	DH21TW0	3.25%	3.25%
			DOVH2DSP2	0.33%	0.00%	**TOTAL**	**100.00%**	**100.00%**
			DTRDESDS0	28.62%	33.40%			
			DTRDESDS1	28.54%	33.30%			
			DTRDESDS2	28.54%	33.30%			
			TOTAL	**100.00%**	**100.00%**			

NOTES:
Noise model tracks shown on Exhibit 2.7-8.
Totals may not add due to rounding.
SOURCES: US Department of Transportation, Federal Aviation Administration, Aviation Environmental Tool (AEDT) Version 3d; Ricondo & Associates, Inc., October 2021.

2.7.6 PERFORMANCE CHARACTERISTICS

Aircraft weight during departure is a factor in the level of noise experienced on the ground because it impacts the rate at which an aircraft can climb. Generally, the heavier the aircraft, the slower the rate of climb, and the distribution of noise along its route of flight tends to be larger. The AEDT uses the distance flown to the destination as a surrogate for the weight, by assuming fuel load necessary to reach that first destination has a direct relationship to the takeoff weight. The AEDT groups trip lengths into nine stage length categories and assigns various aircraft weights associated with up to all nine categories. **Table 2.7-15** summarizes the stage length categories.

TABLE 2.7-15 STAGE LENGTH CATEGORIES

CATEGORY	STAGE LENGTH (NAUTICAL MILES)
1	0 – 500
2	500 – 1,000
3	1,000 – 1,500
4	1,500 – 2,500
5	2,500 – 3,500
6	3,500 – 4,500
7	4,500 – 5,500
8	5,500 – 6,500
9	6,500 +

SOURCE: US Department of Transportation, Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT): Version 3d Technical Manual*, March 2021.

Departure stage length assignments were based on the distance to a flight's nonstop designation. Most general aviation and military aircraft do not have multiple stage lengths available in the model; therefore, the available stage length of "1" in the AEDT was used. **Table 2.7-16** summarizes the proportion of the aircraft operations with multiple stage lengths available in the AEDT that are assumed to fall within each of the stage length categories used for the 2019 existing and 2027 forecast conditions. For 2019, the destinations served for an AAD were based on flights provided in representative published flight schedules for commercial operations, as well as 2019 US DOT T-100 data for unscheduled operations (cargo operations). A representative destination city was correlated to a specific aircraft type for 2019. The forecast flight schedules developed for the Master Plan Update were used to determine destinations by aircraft type for scheduled commercial operations in 2027. The proportions of designations served by unscheduled cargo operations were maintained from 2019 proportions.

TABLE 2.7-16 DEPARTURE STAGE LENGTH DISTRIBUTION

YEAR	STAGE LENGTH					
	1	2	3	4	5	TOTAL
2019	63.32%	0.00%	0.00%	33.53%	3.15%	100.00%
2027	59.25%	0.00%	0.00%	37.42%	3.33%	100.00%

NOTE: The stage length is the nonstop distance flown by an aircraft departing the Airport. The greater the stage length, the greater the fuel load and the heavier the aircraft. The heavier aircraft weights result in slower climb performance, which tends to result in greater noise levels on the ground.

SOURCES: Diio Mi, October 2021 (Innovata scheduled carrier flight data for CY 2019); US Department of Transportation, (T-100 Database for 2019 and 2027); Ricondo & Associates, Inc., *Lihue Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*, March 2020; US Department of Transportation, Federal Aviation Administration, *Aviation Forecast Approval-Lihue Master Plan,* September 30, 2020; Ricondo and Associates Inc. October 2021.

Note that standard fixed-wing aircraft performance profile data for arrivals and departures were used in the AEDT calculations. There were no user-defined performance profiles used in the AEDT model; therefore, the FAA AEE approval was not required.

The AEDT aircraft database provides standard arrival and departure profiles for helicopters. All helicopter altitude profiles include a level segment at 1,000 feet above field elevation (AFE) after climb or prior to descent. This level segment continues for the entire track after climb or at the start of an arrival track up to the point where it descends. Noise calculations were limited to an area where DNL 55 dBA and higher exposure levels are expected; therefore, terrain was not a factor that would require modifying the helicopter altitude profile.

3. NOISE EXPOSURE MAPS

As previously described, the compiled data were used as input to the FAA's AEDT Version 3d. Aircraft noise contours are presented at levels of DNL 55, 60, 65, 70, and 75 dBA. DNL 65 dBA and higher is identified in 14 CFR Part 150 to be significant noise for noise-sensitive land uses, such as residential, transient lodging, schools, places of worship, libraries, hospitals, nursing homes, auditoriums, outdoor amphitheaters, concert halls, and historic properties.[36, 37]

The noise contours represent the daily energy average of all 365 days of operation for the 2019 existing and 2027 forecast conditions. The noise contour pattern extends from each runway end and reflects the flight tracks used by all aircraft. The relative distance of the noise contours from the Airport along each route is a function of the frequency of each runway use for total arrivals and departures, use at night, and aircraft type.

GIS software, along with information on land use, population, dwelling units, and the NEM contours, was used to conduct a spatial analysis to identify incompatible land uses exposed to various levels of aircraft noise and the number of people, dwelling units, and noise-sensitive sites that are incompatible with the aircraft noise exposure levels they experience.

3.1 2019 EXISTING CONDITION NOISE EXPOSURE MAP

Exhibit 3.1-1 depicts the AAD noise exposure pattern for the 2019 existing condition, as well as the current land uses around the Airport in relation to the noise exposure pattern. Consistent with 14 CFR Part 150, the DNL 65, 70, and 75 dBA noise contours are depicted on the exhibit. Residential and other noise-sensitive land uses are identified in 14 CFR Part 150 as incompatible with aircraft noise of DNL 65 dBA and higher. Exhibit 3.1-1 also depicts the DNL 60 dBA noise contour and the DNL 55 dBA noise contour for State informational purposes only. Residential and other noise-sensitive land uses within the DNL 60 dBA noise contour are considered incompatible by the State of Hawaii recommended guidelines. The DNL 55 dBA noise contour is shown for informational purposes as described in Section 1.3.5. **Table 3.1-1** summarizes the land area (in acres) within each noise contour level.

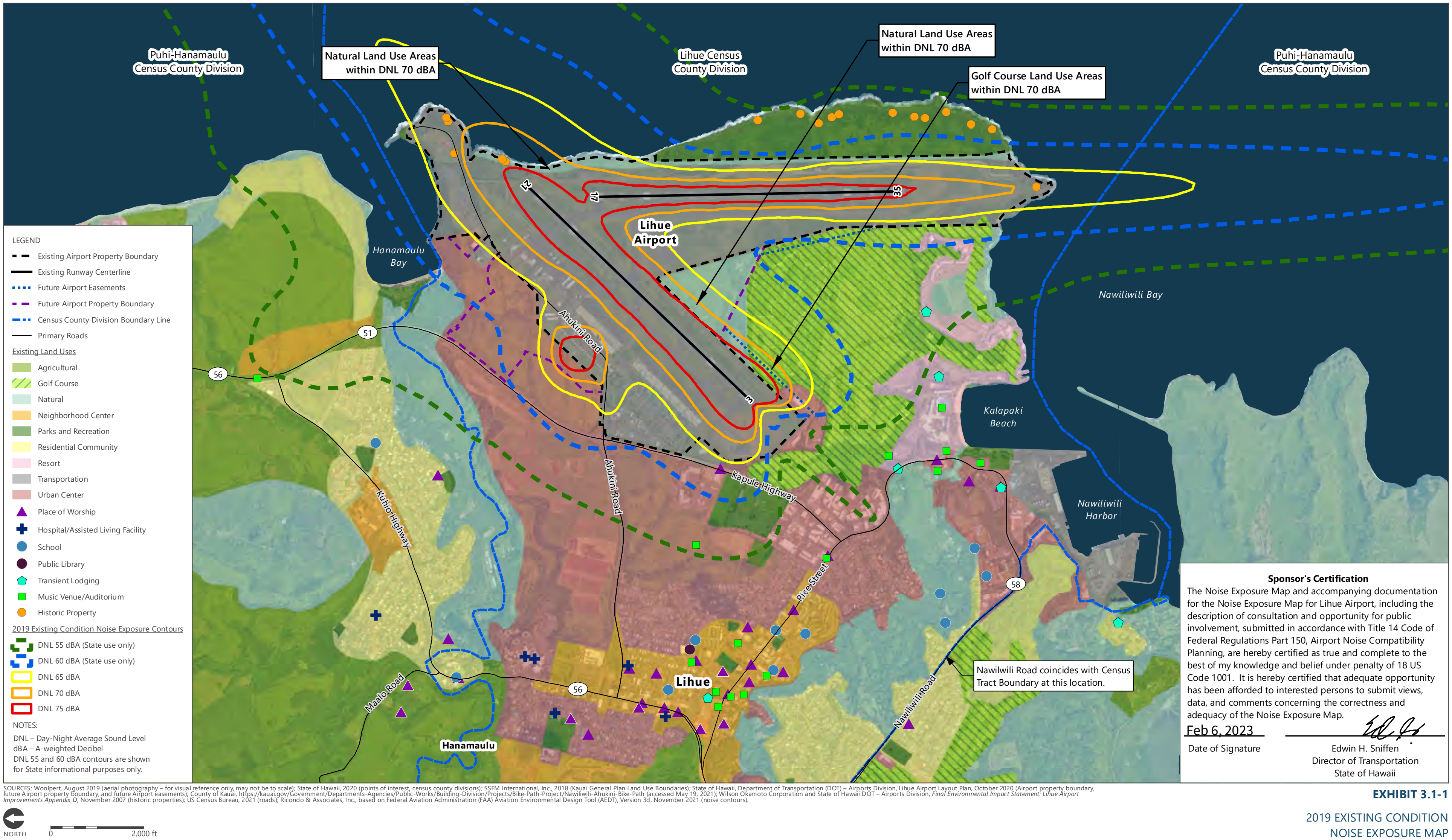
TABLE 3.1-1 LAND AREA – 2019 EXISTING CONDITION

DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN A-WEIGHTED DECIBELS (DBA)	LAND AREA (ACRES)
DNL 55–60	994.14
DNL 60–65	502.55
DNL 65–70	376.34
DNL 70–75	220.58
DNL 75+	237.29
TOTAL DNL 60+	**1,336.76**
TOTAL DNL 65+	**834.20**

NOTE: Totals may not add due to rounding.
SOURCE: Ricondo & Associates, Inc., November 2021 (based on the Federal Aviation Administration's Aviation Environmental Design Tool [AEDT], Version 3d).

[36] Historic properties are those that are listed in or eligible for listing in the National Register of Historic Places.

[37] Per 14 CFR 150.101(e)(6), noise exposure maps must also contain and identify the location of noise sensitive public buildings (such as schools, hospitals, and health care facilities), and properties on or eligible for inclusion in the National Register of Historic Places.



Sponsor's Certification

The Noise Exposure Map and accompanying documentation for the Noise Exposure Map for Lihue Airport, including the description of consultation and opportunity for public involvement, submitted in accordance with Title 14 Code of Federal Regulations Part 150, Airport Noise Compatibility Planning, are hereby certified as true and complete to the best of my knowledge and belief under penalty of 18 US Code 1001. It is hereby certified that adequate opportunity has been afforded to interested persons to submit views, data, and comments concerning the correctness and adequacy of the Noise Exposure Map.

Feb 6, 2023
Date of Signature

Edwin H. Sniffen
Director of Transportation
State of Hawaii

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., based on Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT), Version 3d, November 2021 (noise contours).

EXHIBIT 3.1-1

2019 EXISTING CONDITION NOISE EXPOSURE MAP

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The overall shape of the noise contours is primarily a function of the combination of runway use, flight tracks, and time-of-day operations at LIH. The shape of the noise contours north and south of the Airport reflects the predominant use of the primary runways – Runway 3 for departures and Runway 35 for arrivals. Helicopter arrivals from the northwest influence the shape of the DNL 55 dBA noise contour to the northwest, and helicopter operations influence the shape of the DNL 60 dBA and DNL 65 dBA noise contours west of the Airport.

Table 3.1-2 summarizes the residential dwelling units, population, and noise-sensitive public facilities exposed to aircraft noise levels of DNL 65 dBA and higher and DNL 60 dBA and higher for the 2019 existing condition. US Decennial Census data for 2020 by Census Tract was used to calculate a population factor for each census tract intersecting the 2019 Existing Condition or 2027 Forecast Conditions NEM contours exposed to DNL 55 dBA and higher. Two census tracts intersect the two NEM contours, Census Tracts 404.01 and 405, with a population factor of four and three, respectively. Dwelling units were manually counted within noise contours using a combination of land use, aerial survey, and the County of Kauai's assessor's information.

As shown in Table 3.1-2, there are no dwelling units or population within the DNL 65 dBA or DNL 60 dBA noise contours.

For informational purposes only, Exhibit 3.1-1 shows the DNL 55 dBA noise contour, extending to the south, west, and north of the airfield. There is one residential dwelling unit, with an estimated population of four between the DNL 55 and 60 dBA noise contours. All uses between the DNL 55 and 60 dBA are considered compatible by FAA guidelines and the State of Hawaii recommended guidelines.

Golf courses are included in the land use category "golf courses, riding stables, and water recreation" in FAA guidelines and "public golf courses, riding stables, cemeteries, gardens, etc." in the State of Hawaii recommended guidelines. Approximately 10 acres of a golf course are within the DNL 70 dBA and higher noise contour, which is considered incompatible by FAA guidelines. Approximately 132 acres of golf course are within the DNL 60 dBA and higher noise contour, which is considered incompatible by the State of Hawaii recommended guidelines.

Resort land uses are most closely related to "transient lodgings" in FAA guidelines and "low density residential, resorts, and hotels (outdoor facility)" and "transient lodgings with limited outdoor use" in the State of Hawaii recommended guidelines. No resort land use is within the DNL 65 dBA noise contour. Approximately 4 acres of resort land use are within the DNL 60 dBA noise contour, which is considered incompatible by the State of Hawaii recommended guidelines. Resort land use within the DNL 60 dBA noise contour includes structures associated with Kauai Lagoons Marina at Marriott's Kauai Lagoons Kalanipuʻu.

As indicated in the 2018 Kauai General Plan, land use designated as "natural" includes State Land Use Conservation District land and County Open Zoning District land as well as the ridges, waterfalls, river valleys, and coastline of the island that comprise its open spaces and scenic views. Natural land uses are most closely related to "nature exhibits and zoos" in FAA guidelines and "nature exhibits and zoos, neighborhood parks" and "extensive natural wildlife and recreation areas" in the State of Hawaii recommended guidelines. Approximately 24 acres of natural land are within the DNL 70 dBA and higher noise contour, which is considered incompatible by FAA guidelines. Approximately 94 acres of natural land are within the DNL 60 dBA and higher noise contour (of which, approximately 52 acres are within the DNL 65 dBA and higher noise contour), which is considered incompatible by the State of Hawaii recommended guidelines.[38]

[38] Per the State of Hawaii recommended guidelines, "Extensive natural wildlife and recreation areas" are considered incompatible at and above DNL 60 dBA; "Nature exhibits and zoos, neighborhood parks" are considered incompatible at and above DNL 65 dBA.

TABLE 3.1-2 RESIDENTIAL UNITS, POPULATION, AND NOISE-SENSITIVE FACILITIES – 2019 EXISTING CONDITION

LAND USE		ANNUAL DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN A-WEIGHED DECIBELS (DBA)					
		60-65	65-70	70-75	**60+**	**65+**	**70+**
Residential	Population [1]	0	0	0	**0**	**0**	**0**
	Dwelling Units	0	0	0	**0**	**0**	**0**
Noise-Sensitive Facilities	Music Venues/Auditoriums	0	0	0	**0**	**0**	**0**
	Place of Worship [2]	1	0	0	**1**	**0**	**0**
	Hospitals	0	0	0	**0**	**0**	**0**
	Public Libraries	0	0	0	**0**	**0**	**0**
	Hospitals/Assisted Living Facilities	0	0	0	**0**	**0**	**0**
	Transient Lodging [3]	0	0	0	**0**	**0**	**0**
Other	Historic Properties [4]	0	4	2	**6**	**6**	**2**

NOTES:
1 Population counts do not include transient lodging.
2 Place of Worship is consistent with 14 CFR Part 150 "churches".
3 Transient Lodging includes resorts, hotels, and timeshares.
4 Historic properties are those that are listed in or eligible for listing in the National Register of Historic Places.
SOURCES: US Census Bureau, 2020 (census tract data); State of Hawaii, 2020 (points of interest); County of Kauai, Kauai Real Property Assessment, https://qpublic.schneidercorp.com/Application.aspx?AppID=986&LayerID=20101&PageTypeID=1&PageID=8741&KeyValue=380180010000 (accessed November 2021); Wilson Okamoto Corporation and State of Hawaii DOT Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); Ricondo & Associates, Inc., November 2021 (based on Federal Aviation Administration Aviation Environmental Design Tool [AEDT], Version 3d).

No places of worship are within the DNL 65 dBA and higher noise contour. One place of worship, New Hope Lihue, located at 3215 Kapule Highway, is within the DNL 60 dBA and higher noise contour, which is considered incompatible by the State of Hawaii recommended guidelines.

Six historic properties are within the DNL 60 dBA and higher noise contour. Four of the six historic properties are located in the DNL 65 dBA and higher noise contour in transportation land use areas, which is considered compatible by both FAA guidelines and the State of Hawaii recommended guidelines. The remaining two historic properties are located in the DNL 70 dBA and higher noise contour in natural land use areas, which is considered incompatible by both FAA guidelines and the State of Hawaii recommended guidelines. **Table 3.1-3** provides information regarding the six historic properties. Although a historic property may be located in an area that is considered incompatible by FAA guidelines and/or the State of Hawaii recommended guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places.

TABLE 3.1-3 HISTORIC PROPERTIES LOCATED WITHIN THE DNL 60 DBA AND HIGHER NOISE CONTOURS

STATE INVENTORY OF HISTORICS PLACES NUMBER	SITE TYPE	FUNCTION	DESCRIPTION	LOCATED WITHIN NOISE EXPOSURE CONTOUR	LAND USE DESIGNATION	LAND USE COMPATIBILITY PER FAA GUIDELINES	LAND USE COMPATIBILITY PER STATE OF HAWAII GUIDELINES
50-30-11-2087	Nawiliwili Harbor Light, Wall Remnants, and Building Foundations	Lighthouse and Associated Remnants of Caretaker's Quarters	Series of features interpreted as being associated with Nawiliwili Harbor Light	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2096	Ditch	Drainage	Concrete drainage ditch	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2097	Ditch	Drainage	Concrete drainage ditch	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2103	Structural Foundations	Industrial Complex	Remnants of five foundations associated with a historic industrial complex present near Ahukini Landing	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-08-3958	Enclosures and Related Structures	Animal Husbandry	Piggery dating from the plantation era	DNL 70 dBA	Natural	Incompatible [1]	Incompatible [2]
	Enclosures and Related Structures	Animal Husbandry	Piggery dating from the plantation era	DNL 70 dBA	Natural	Incompatible [1]	Incompatible [2]

NOTES:

Historic properties are those that are listed in or eligible for listing in the National Register of Historic Places.

1 Although a historic property may be located in an area that is considered incompatible by FAA guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places. Natural land uses are most closely related to "Nature exhibits and zoos" in Title 14 Code of Federal Regulations Part 150 land use compatibility guidelines (see Table A.2-2 in Appendix A). Per FAA guidelines, these uses are considered incompatible at DNL 70 dBA and higher.

2 Although a historic property may be located in an area that is considered incompatible by the State of Hawaii recommended guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places. Natural land uses are most closely related to "Nature exhibits and zoos, neighborhood parks" and "Extensive natural wildlife and recreation areas" in State of Hawaii land use compatibility guidelines (see Table A.2-3 in Appendix A). Per State of Hawaii guidelines, these uses are considered incompatible at DNL 70 dBA and higher.

dBA – A-Weighted Decibels

DNL – Day-Night Average Sound Level

FAA – Federal Aviation Administration

SOURCES: Monahan, Chris, Ph.D., and Hallett H. Hammatt, Ph.D., *Archaeological Literature Review and Field Inspection Report for the Nawiliwili-Ahukini Bike Path Project, Nawiliwili, Kalapaki and Hanama'ulu Ahupua'a, Lihu'e District, Kaua'I Island*, July 2008; Wilson Okamoto Corporation and State of Hawaii Department of Transportation – Airports Division, *Final Environmental Impact Statement, Lihue Airport Improvements*, November 2007; Appendix A of this document.

3.2 2027 FORECAST CONDITIONS NOISE EXPOSURE MAP

Exhibit 3.2-1 depicts the expected AAD noise exposure pattern for the 2027 forecast conditions. This noise contour pattern is reflective of typical operating conditions at LIH, combined with the future changes to Runway 3-21 and associated noise model tracks, operational levels, and fleet mix as described in Chapter 2. Consistent with 14 CFR Part 150, the DNL 65, 70, and 75 dBA noise contours are depicted on the exhibit. Residential and other noise-sensitive land uses are identified in 14 CFR Part 150 as incompatible with aircraft noise of DNL 65 dBA and higher. Exhibit 3.2-1 also depicts the DNL 60 dBA noise contour and the DNL 55 dBA noise contour for State informational purposes only. Residential and other noise-sensitive land uses within the DNL 60 dBA noise contour are considered incompatible by the State of Hawaii recommended guidelines. The DNL 55 dBA noise contour is shown for informational purposes as described in Section 1.3.5.

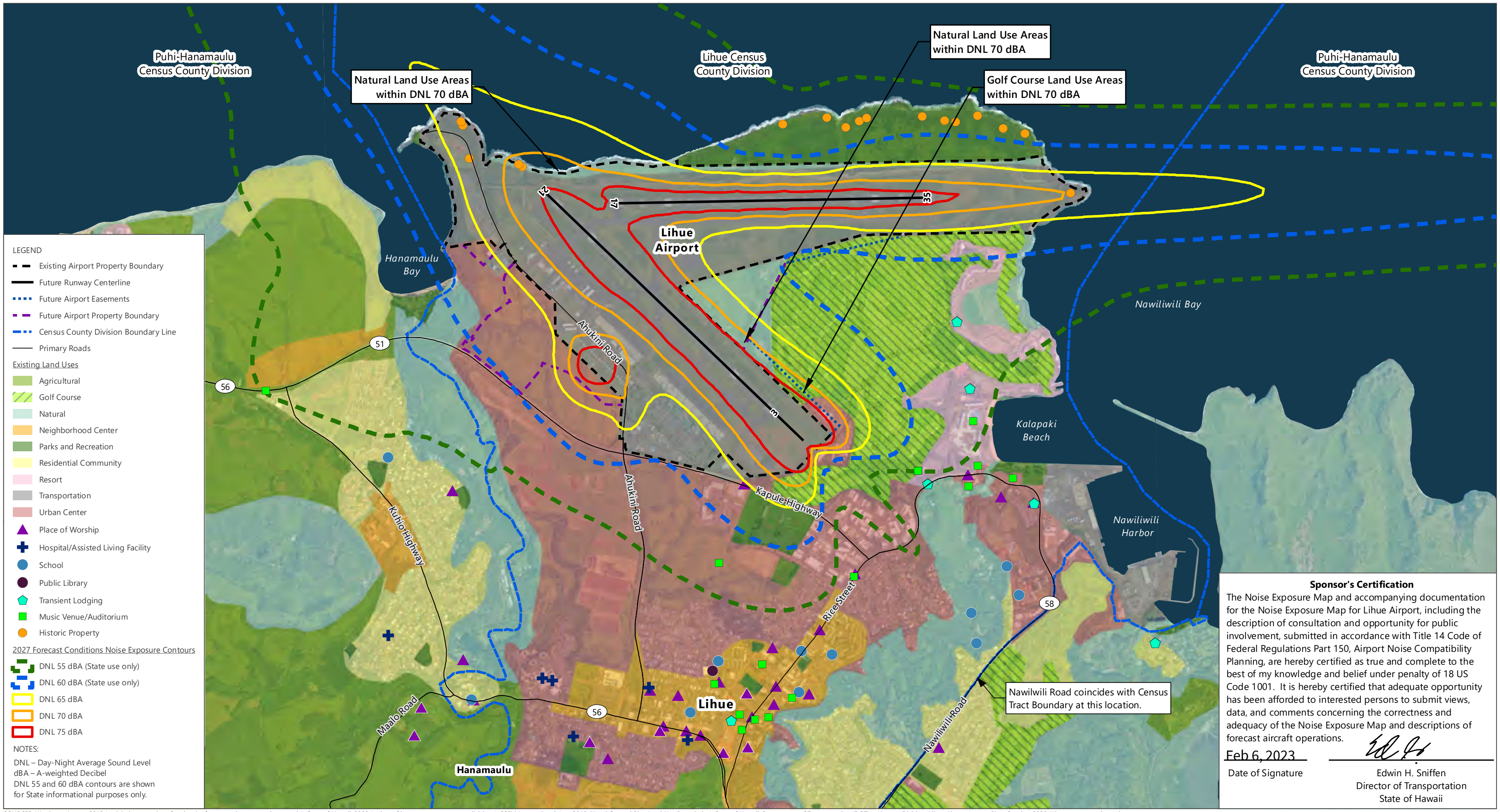
Table 3.2-1 compares the land area within each aircraft noise contour level for the existing and future conditions.

TABLE 3.2-1 LAND AREA COMPARISON – 2019 EXISTING AND 2027 FORECAST CONDITIONS

ANNUAL DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN A-WEIGHTD DECIBELS (DBA)	LAND AREA (ACRES)		
	EXISTING – 2019	FORECAST – 2027	DIFFERENCE
DNL 55–60	994.14	1,141.14	147.01
DNL 60–65	502.55	580.62	78.06
DNL 65–70	376.34	399.34	23.01
DNL 70–75	220.58	249.84	29.26
DNL 75+	237.29	259.77	22.48
TOTAL DNL 60+	**1,336.76**	**1,489.57**	**152.81**
TOTAL DNL 65+	**834.20**	**908.95**	**74.75**

NOTE: Totals may not add due to rounding.
SOURCE: Ricondo & Associates, Inc., November 2021 (based on the Federal Aviation Administration's Aviation Environmental Design Tool [AEDT], Version 3d).

The overall shape of the noise contours is generally similar to that of the 2019 existing condition noise contours. As evidenced in the comparison of noise contour areas reported in Table 3.2-1, the areas within the 2027 forecast conditions noise contours are slightly larger than those of the 2019 existing condition and departure noise from Runway 3 is shifted to the southwest due to the southwestern shift of the Runway 3 departure end. These changes are to be expected due to the forecast increase in operations by 2027 as compared to 2019 and the approved RSA improvements for Runway 3-21.



SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); State of Hawaii, 2020 (points of interest, census county divisions); SSFM International, Inc., 2018 (Kauai General Plan Land Use Boundaries); State of Hawaii, Department of Transportation (DOT) – Airports Division, Lihue Airport Layout Plan, October 2020 (Airport property boundary, future Airport property boundary, and future Airport easements); County of Kauai, https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021); Wilson Okamoto Corporation and State of Hawaii DOT – Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads); Ricondo & Associates, Inc., based on Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT), Version 3d, November 2021 (noise contours).

NORTH 0 2,000 ft

EXHIBIT 3.2-1

2027 FORECAST CONDITIONS
NOISE EXPOSURE MAP

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Table 3.2-2 summarizes the residential dwelling units, population, and noise-sensitive public facilities affected by the aircraft noise levels of DNL 65 dBA and higher and DNL 60 dBA and higher for the 2027 forecast conditions. Comparing the noise pattern to the land use map shows that there are no residential units within the DNL 65 dBA noise contour for 2027 forecast conditions. There would be 6 residential units with 18 residents exposed to aircraft noise between DNL 60 and 65 dBA, which is considered incompatible by the State of Hawaii recommended guidelines. The six residential units are in the southwest area of the DNL 60 dBA noise contour at Kamamalu Condominiums, located at 3920 Haoa Street. The Kamamalu Condominiums comprise 31 residential units total within 3 structures; the noise contour partially intersects 1 structure with an estimated 12 residential units.

For informational purposes only, Exhibit 3.2-1 shows the DNL 55 dBA noise contour and the estimated residential impact is recorded. Some areas of residential communities would be between the DNL 55 and 60 dBA noise contours, including 451 dwelling units with an estimated population of 1,563. The estimated dwelling units between the DNL 55 and 60 dBA consist of 88 existing residential dwelling units to the southeast and east, and 363 residential dwelling units in future developments, including the Kohea Loa development to the northwest, and the proposed Timbers Resorts Kauai's Hokuala Phase I Master Plan Development south of the airfield. All uses between the DNL 55 and 60 dBA noise contours are considered compatible by FAA guidelines and the State of Hawaii recommended guidelines.

TABLE 3.2-2 RESIDENTIAL UNITS, POPULATION, AND NOISE-SENSITIVE FACILITIES – 2027 FORECAST CONDITIONS

LAND USE		ANNUAL DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN A-WEIGHED DECIBELS (DBA)					
		60-65	65-70	70-75	**60+**	**65+**	**70+**
Residential	Population [1]	18	0	0	**18**	**0**	**0**
	Dwelling Units	6	0	0	**6**	**0**	**0**
Noise-Sensitive Facilities	Music Venues / Auditoriums	0	0	0	**0**	**0**	**0**
	Place of Worship [2]	1	0	0	**1**	**0**	**0**
	Hospitals	0	0	0	**0**	**0**	**0**
	Libraries	0	0	0	**0**	**0**	**0**
	Nursing Homes	0	0	0	**0**	**0**	**0**
	Transient Lodging [3]	0	0	0	**0**	**0**	**0**
Other	Historic Properties [4]	0	4	2	**6**	**6**	**2**

NOTES:

1 Population counts do not include transient lodging.

2 Place of Worship is consistent with 14 CFR Part 150 "churches".

3 Transient Lodging includes resorts, hotels, and timeshares.

4 Historic properties are those that are listed in or eligible for listing in the National Register of Historic Places.

SOURCES: US Census Bureau, 2020 (census tract data); State of Hawaii, 2020 (points of interest); County of Kauai, Kauai Real Property Assessment, (https://qpublic.schneidercorp.com/Application.aspx?AppID=986&LayerID=20101&PageTypeID=1&PageID=8741&KeyValue=380180010000, accessed: November 2021); Wilson Okamoto Corporation and State of Hawaii DOT Airports Division, Final Environmental Impact Statement: Lihue Airport Improvements Appendix D, November 2007 (historic properties); Gary Siracusa, Director of Construction, Timbers Resorts Kauai, "Proposed Development Plans for LIH NEM Update", email to Ricondo & Associates, Inc. Staff, November 11, 2021; Ricondo & Associates, Inc., November 2021 (based on Federal Aviation Administration Aviation Environmental Design Tool [AEDT], Version 3d).

Approximately 12 acres of golf course would be within the DNL 70 dBA and higher noise contour, which is considered incompatible by FAA guidelines. Approximately 184 acres of golf course would be within the DNL 60 dBA and higher noise contour, which is considered incompatible by the State of Hawaii recommended guidelines.

No resort land use would be within the DNL 65 dBA and higher noise contour. Approximately 8 acres of resort land use would be within the DNL 60 dBA and higher noise contour, which is considered incompatible by the State of Hawaii recommended guidelines. Resort land use located within the DNL 60 dBA and higher noise contour includes structures associated with Kauai Lagoons Marina at Marriott's Kauai Lagoons Kalanipu'u.

Approximately 23 acres of natural land would be within the DNL 70 dBA and higher noise contour, which is considered incompatible by FAA guidelines. Approximately 103 acres of natural land would be within the DNL 60 dBA and higher noise contour (of which, approximately 54 acres would be within the DNL 65 dBA and higher noise contour), which is considered incompatible by the State of Hawaii recommended guidelines.[39]

Consistent with the 2019 existing condition NEM discussed in Section 3.1, no places of worship would be within the DNL 65 dBA and higher noise contour. One place of worship, New Hope Lihue, would be within the DNL 60 dBA and higher noise contour, which is considered incompatible by the State of Hawaii recommended guidelines.

Consistent with the 2019 existing condition NEM discussed in Section 3.1, six historic properties would be within the DNL 60 dBA and higher noise contour. Four of the six historic properties would be located in the DNL 65 dBA and higher noise contour in transportation land use areas, which is considered compatible by both FAA guidelines and the State of Hawaii recommended guidelines. The remaining two historic properties would be located in the DNL 70 dBA and higher noise contour in natural land use areas, which is considered incompatible by both FAA guidelines and the State of Hawaii recommended guidelines. Table 3.1-3 provides information regarding the six historic properties. Although a historic property may be located in an area that is considered incompatible by FAA guidelines and/or the State of Hawaii recommended guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places.

[39] Per the State of Hawaii recommended guidelines, "Extensive natural wildlife and recreation areas" are considered incompatible at and above DNL 60 dBA. "Nature exhibits and zoos, neighborhood parks" are considered incompatible at and above DNL 65 dBA.

4. CONSULTATION AND PUBLIC REVIEW

The Part 150 NEM Update study included consultation with municipalities and stakeholders (those required by 14 CFR 150.21[b] and A150.105[a]) through a Technical Advisory Committee (TAC). The Study also provided an opportunity for interested persons to comment during public information meetings. Per 14 CFR 150.21(b) and A150.105(a) (Appendix A to Part 150), the NEMs and documentation should be submitted

> in consultation with states, public agencies, and planning agencies whose area, or any portion of whose area, of jurisdiction is within the DNL 65 dBA contour depicted on the map, FAA regional officials, and other Federal officials having local responsibility for land uses depicted on the map. This consultation must include regular aeronautical users of the airport. The airport operator shall certify that it has afforded interested persons adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure map and descriptions of forecast aircraft operations.

For the Study, stakeholder representatives include the County of Kauai; the FAA; State and federal congressional representatives; the US Department of Agriculture; the Department of Land and Natural Resources; the Kauai Chamber of Commerce; and the Kauai Visitors Bureau. 14 CFR 150.21(b) also indicates that the NEMs and documentation allow the opportunity for the public review and comment. Documents supporting the consultation process and opportunities for the public to comment are provided in **Appendix C**.

Public comments were considered when the Study was finalized. One written public comment was received (see **Appendix D**).

4.1 TECHNICAL ADVISORY COMMITTEE

Members of the NEM TAC are the same members as the Master Plan Update TAC, apart from federal congressional representation. **Table 4.1-1** lists the TAC members. The first NEM TAC meeting was conducted on October 25, 2021, and the second TAC meeting was conducted on May 4, 2022. Information presented to the TAC is provided in Appendix C. No written comments on the Draft 14 CFR Part 150 NEM Update study were received from TAC members.

4.2 PUBLIC REVIEW

The first NEM public information meeting was conducted on October 26, 2021, to discuss the noise analysis assumptions and methodology. This meeting provided the community an opportunity to comment on the Airport noise concerns. A copy of the legal notice newspaper affidavit and presentation for the first public information meeting is included in Appendix D. There were no public comments received during the workshop. A second NEM public meeting was conducted on May 5, 2022, to discuss the noise analysis results and provide the public an opportunity to comment on the Draft 14 CFR Part 150 NEM Update study. A copy of the legal notice newspaper affidavit and presentation is included in Appendix D. The public was provided an opportunity to review and comment in writing or an online form on the Draft 14 CFR Part 150 NEM Update study from April 17, 2022, to May 16, 2022. One public comment was received (see Appendix D).

TABLE 4.1-1 TECHNICAL ADVISORY COMMITTEE MEMBERS FOR THE NOISE EXPOSURE MAP UPDATE

NAME	TITLE	REPRESENTING [1]
Brian Schatz	US Senator	US Senate
Mazie Hirono	US Senator	US Senate
Kai Kahele	District 2 US Representative	US Congress
Harold Taira	Port Director	US Department of Agriculture
Dee Morikawa	District 16 State Representative	State of Hawaii
James Tokioka	District 15 State Representative	State of Hawaii
Nadine K. Nakamura	District 14 State Representative	State of Hawaii
Ronald D. Kouchi	President, Hawaii State Senate	State of Hawaii
Roth Puahala	Assistant to Senator Ronald D. Kouchi	State of Hawaii
Wesley T. Matsunaga	District Land Agent	Department of Land and Natural Resources
Arryl Kaneshiro	Council Chair	County of Kauai
Don Kakuda	Unknown	County of Kauai, Wastewater Division
Jason Kagimoto	Unknown	County of Kauai, Public Works Department
Kaaina Hull	Director	County of Kauai, Planning Department
Lea Kaiaokamalie	Senior Planner and Geographic Information System Analyst	County of Kauai, Planning Department
Mark Perriello	President/CEO	Kauai Chamber of Commerce
Gordon Wong	Program Manager	Federal Aviation Administration
Kimberly Evans	Community Planner	Federal Aviation Administration
Rod Kitchel	Air Traffic Manager	Lihue Federal Contract Tower, Hawaii
Amy St. Pierre	Manager	Lihue Federal Contract Tower, Hawaii
Sue Kanoho	Executive Director	Kauai Visitors Bureau
Bonita A. Saffold	Real Estate Agent	FedEx Express
Dale Nelson	Unknown	FedEx Feeder Ops – Corporate Air
Tony Ind	Unknown	FedEx
James Mertens	Duty Manager	Airlines Committee of Hawaii/AvAirPros
Dee Miranda	Unknown	Airborne Aviation Hawaii
Kiku Kobo	Unknown	Airborne Aviation Hawaii
Ingrid Wehner	Operations Manager	Aloha Helicopters
Linda Bukoski	Unknown	Island Helicopters
Casey Riemer	Manager	Jack Harter Helicopters
Chantelle Carverio	Unknown	Mauna Loa Helicopters
Kyle Jacobson	Unknown	Safari Helicopters
Dennis Fujimoto	General Public	The Garden Island
Jan TenBruggencate	General Public	Island Strategy

NOTES:

1 Title 14 Code of Federal Regulations Part 150 requires consultation with states, and public agencies and planning agencies whose area, or any portion of whose area, of jurisdiction is within the day-night average sound level (DNL) 65 A-weighted decibels (dBA) contour depicted on the Noise Exposure Map (NEM), Federal Aviation Administration (FAA) regional officials, and other federal officials having local responsibility for land uses depicted on the map. The airport proprietor shall identify each public agency and planning agency whose jurisdiction or responsibility is either wholly or partially within the DNL 65 dBA boundary and supporting documentation shall identify their geographic areas of jurisdiction. The planning agencies highlighted in gray in this table have jurisdiction, and their boundaries are depicted on the NEMs.

SOURCE: Ricondo & Associates, Inc., November 2021.

APPENDIX A

Federal Aviation Administration Policies, Guidance, and Regulations

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APPENDIX A FEDERAL AVIATION ADMINISTRATION POLICIES, GUIDANCE, AND REGULATIONS

The Federal Aviation Administration's (FAA's) policies, guidance, and regulations discussed herein were taken from State of Hawaii statutes and the previous State of Hawaii, Department of Transportation – Airports Division (DOT-A) noise exposure map (NEM) and noise compatibility program (NCP) reports published by DOT-A. These were updated to reflect current regulations and the applicability to Lihue Airport.

A.1 NOISE CONTROL POLICIES AND GUIDANCE

The FAA published a series of regulations, as directed from Congress in a series of authorizing statutes. There are four separate regulations in the Code of Federal Regulations (CFR) that specifically address permissible aircraft noise levels, operating procedures, and studies of aircraft noise levels regarding aircraft activity within the United States.

A.1.1 TITLE 14 CODE OF FEDERAL REGULATIONS PART 36

14 CFR Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*, establishes noise levels that are permitted for aircraft of various weights, engine number, and date of certification. Through the Noise Control Act of 1972, aircraft were divided into three classes based on the amount of noise the aircraft produced at three specific noise measurement locations during certification testing. These stages are as follows:

- Stage 1 – typically the first generation of jets used in passenger and cargo service, designed before 1974, and having measured noise levels that exceed the standards set for the other classes of aircraft. This group included the Boeing 707, early 727 and 737 aircraft, and early DC-8 aircraft. Under 14 CFR Part 91, all such aircraft weighing more than 75,000 pounds were removed from the US operating fleet by 1985, unless modified to meet Stage 2 noise requirements.
- Stage 2 – aircraft that were type certified before November 15, 1975, that met noise levels defined by the FAA at takeoff, sideline, and approach measurement locations. The permissible amount of noise increased with the weight of the aircraft above 75,000 pounds and the number of engines. This category included many of the second-generation jet aircraft, such as the Boeing 727, 737-200, and DC-9, that were extensively used in passenger and cargo service. Under 14 CFR Part 91, all such aircraft weighing over 75,000 pounds were removed from the US operating fleet by 2000, unless modified (with engine hushkits) to meet Stage 3 noise requirements.
- Stage 3 – aircraft that meet the stringent noise level requirements at takeoff, sideline, and approach measurement locations for aircraft weight and engine number. This category includes most business jet aircraft and all aircraft in passenger and cargo service that weigh over 75,000 pounds.
- Stage 4 – all jet and transport-category airplanes with a maximum takeoff weight of 12,500 pounds or more for which the application of a new type of design is submitted on or after January 1, 2006. The FAA's final Part 36 Stage 4 noise levels are a cumulative 10 effective perceived noise level in decibels (EPNdB) less than the current Stage 3 limits. The Stage 4 Final Rule requires that any application for a new airplane type design after January 1, 2006, must meet a cumulative 10-decibel (dB) reduction from Stage 3 standards based on the three phases of measurement: takeoff, sideline, and approach. The Stage 4 noise requirement is significant in that it

seeks to standardize the certification levels between the US policy and the international policy, as outlined by the International Civil Aviation Organization (ICAO) regulations.

- Stage 5 – subsonic jets and subsonic transport category large aircraft are subject to stringent noise certification in the United States effective November 2017 and must be consistent with the ICAO Annex 16 Chapter 14 noise standards that went into effect in July 2014. The noise standard applies to any person applying for a new type of design with a maximum takeoff weight of 121,254 pounds or more on or after December 31, 2017, and after December 31, 2020, for aircraft with a maximum takeoff weight of less than 121,254 pounds.[1] The FAA understands the ICAO Chapter 14 requirements as follows:
  1. An aircraft's maximum flyover, lateral, and approach noise levels are each subtracted from the maximum permitted noise levels for Chapter 3 defined in Annex 16. The differences obtained are the noise limit margins, which must be 17 EPNdB or greater when added together.
  2. An aircraft's maximum noise levels (flyover, lateral, and approach) have to be at least 1 EPNdB less than the maximum permitted noise levels for Chapter 3 airplanes.[2]

A.1.2 TITLE 14 CODE OF FEDERAL REGULATIONS PART 91

14 CFR Part 91, *General Operating and Flight Rules*, established schedules for phasing louder equipment out of the operating fleet of aircraft weighing more than 75,000 pounds. Stage 1 aircraft over 75,000 pounds were scheduled to be removed from the fleet by 1982, except for two-engine aircraft in small city service, which were allowed to continue in service until 1985. The retirement of Stage 2 aircraft expected the removal of all such aircraft by the end of 1999, with interim retirement dates of 1994,1996, and 1998 for the removal of portions of the Stage 2 fleet. No retirement schedules have been enforced for aircraft weighing less than 75,000 pounds and Stage 3 aircraft. Hence, since the completion of the phase out of all Stage 2 aircraft weighing 75,000 pounds or more at the end of 1999, 14 CFR Part 91 has become obsolete. Should retirement schedules be imposed for all or part of the Stage 3 fleet in the future, 14 CFR Part 91 may provide the regulatory system to carry out that phase out.

A.1.3 TITLE 14 CODE OF FEDERAL REGULATIONS PART 150

14 CFR Part 150, *Airport Noise Compatibility Planning*, establishes the standards under which a Part 150 Noise Compatibility Study is conducted. The background and requirements for such studies are presented in Chapter 1 of this document. The preparation of an NCP under Part 150 is voluntary by an airport sponsor. The process of preparing the program is intended to open/improve communication between the airport sponsor, its neighbors, and airport users. It is the only method to provide for the mitigation of aircraft noise impacts on noise-sensitive surrounding areas that are not directly tied to airfield development or airspace use, and it is conducted subject to the rules for the preparation of an environmental impact statement (EIS) or environmental assessment (EA).

A.1.4 TITLE 14 CODE OF FEDERAL REGULATIONS PART 161

14 CFR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*, was published in 1991 after the passage of the Airport Noise and Capacity Act (ANCA) of 1990. The act set the requirement and schedule for the phase out of Stage 2 aircraft over 75,000 pounds and, in return, Congress restricted the ability of local communities to impose actions that would restrict aircraft access to any airport. Different requirements were established for voluntary

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[1] US Government Publishing Office, https://www.govinfo.gov/content/pkg/FR-2017-10-04/pdf/2017-21092.pdf (accessed October 11, 2021).

[2] Federal Register, https://www.federalregister.gov/documents/2016/01/14/2015-32500/stage-5-airplane-noise-standards (accessed October 11, 2021).

restrictions and restrictions on Stage 2 and Stage 3 aircraft. These requirements are applicable to all aircraft except propeller-driven aircraft weighing less than 12,500 pounds, supersonic aircraft, and Stage 1 aircraft.

Restrictive Agreements

Subpart B of 14 CFR Part 161 places notification requirements for the implementation of Stage 3 restrictions through agreements between airport operators and all affected airport users. (Presumably, this same procedure would be followed for implementing agreements for Stage 2 restrictions.) Before implementation, notice of these proposed agreements must be published in local newspapers; posted prominently at the airport; sent directly to all regular airport users, the FAA, and federal, state, and local agencies with land use control authority, as well as any new entrant aircraft operators that are known to be interested in providing service to the airport; and sent to community groups and business organizations. After the notification period, the agreement can be executed if all current users and any new entrants proposing to serve the airport within 180 days sign on to the proposed restriction.

Stage 2 Restrictions

Subpart C of 14 CFR Part 161 sets forth the requirements for establishing restrictions on Stage 2 aircraft operations. It requires a study of the proposed restriction that must include the following:

1. analysis of the costs and benefits of the proposed restriction;
2. description of the alternative restrictions; and
3. description of non-restrictive alternatives that were considered and a comparison of the costs and benefits of those alternatives to the costs and benefits of the proposed restriction.

The regulation further requires that the study use the noise methodology and land use compatibility criteria established in 14 CFR Part 150 [3] and current accepted economic methodology. Where restrictions on Stage 2 aircraft weighing less than 75,000 pounds are involved, the study must include separate detail on how the restriction would apply to aircraft in this class.

After completing the study, the airport operator must publish a notice of the proposed restriction and an opportunity for public comment in a newspaper of general circulation in the area; post a notice prominently in the airport; and notify the FAA, local governments, all airport tenants whose operations might be affected by the proposed restriction, and community groups and business organizations.[4] The FAA must also publish an announcement of the proposed restriction in the Federal Register.[5]

The required study and public notice must be completed at least 180 days before the airport operator implements the proposed restriction.[6] There is no specific provision in ANCA or Part 161 for FAA action on the airport operator's proposed Stage 2 restriction. In practice, the FAA has reviewed Stage 2 Part 161 studies for completeness and has administratively enacted evaluation benchmarks comparable to those used for Stage 3 restrictions, as discussed in the following subsection. No specific deadlines for this review process are set forth in Part 161.

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3 14 CFR 161.9, 161.11, and 161.205(b).

4 14 CFR 161.203(b).

5 14 CFR 161.203(e).

6 14 CFR 161.203(a).

Stage 3 Restrictions

Subpart D of 14 CFR Part 161 provides the criteria that an airport operator must follow to implement a noise or access restriction on Stage 3 aircraft. The required analysis must include the same elements required for a proposed restriction on Stage 2 aircraft. In addition, the required Part 161 Study must demonstrate "by substantial evidence that the statutory conditions are met." The six conditions specified in ANCA are as follows:

- Condition 1: The proposed restriction is reasonable, non-arbitrary, and nondiscriminatory.
- Condition 2: The proposed restriction does not create an undue burden on interstate or foreign commerce.
- Condition 3: The proposed restriction maintains safe and efficient use of the navigable airspace.
- Condition 4: The proposed restriction does not conflict with any existing federal statute or regulation.
- Condition 5: The applicant has provided adequate opportunity for public comment on the proposed restriction.
- Condition 6: The proposed restriction does not create an undue burden on the National Aviation System (NAS).[7]

The applicant must also prepare appropriate environmental documentation.[8]

After an airport operator submits a complete Part 161 application package, the FAA has 30 days to review. If deemed incomplete, the application may be returned to the applicant for further study and documentation. Notice of the proposed restriction must be published by the FAA in the Federal Register. After reviewing the application and public comments, the FAA must issue a decision within 180 days after receipt of the complete application. This decision is a final decision of the FAA Administrator for purposes of judicial review.[9]

Consequences of Failing to Comply with Part 161

Subpart F of 14 CFR Part 161 states the consequences of an airport operator's failure to comply with Part 161. The sanction provided is the termination of the airport eligibility to receive airport grant funds and to collect passenger facility charges (PFCs).[10] The processes for notifying airport operators of apparent violations, disputing the resolution, and implementing the required sanctions are also provided.

A.2 LAND USE POLICIES AND GOVERNANCE

This section discusses the pioneering efforts of land use guidelines, the role of land use controls, the responsible entities for implementing the controls, and the FAA mitigation policy, FAA program guidance letters, and State of Hawaii land use guidelines.

A.2.1 PIONEERING EFFORTS OF LAND USE COMPATIBILITY GUIDELINES

Numerous noise/land use compatibility guidelines have been developed by federal agencies through the years. In 1964, the FAA and Department of Defense (DOD) published guidelines for land use planning in areas prone to

[7] 14 CFR 161.205(e).

[8] 14 CFR 161.203(c).

[9] 14 CFR 151.313(b)(2).

[10] 14 CFR 161.501.

aircraft noise. In 1971, the Department of Housing and Urban Development (HUD) published noise assessment guidelines for evaluating sites suitable for housing assistance.

In 1974, the US Environmental Protection Agency (EPA) recommended maximum noise exposure levels to protect public health with an adequate margin of safety, as summarized in **Table A.2-1**.[11] The US EPA's research proposed that noise above day-night average sound level (DNL) 55 A-weighted decibels (dBA) interferes with outdoor activities, while indoor activities may become hindered if interior noise levels exceed DNL 45 dBA. It is assumed that standard residential construction attenuates noise by approximately 20 dBA, with doors and windows closed. Therefore, a DNL 45 dBA interior noise level corresponds to a DNL 65 dBA exterior noise level. In 1977, the FAA released an advisory circular concerning airport land use compatibility planning that included the US EPA guidelines. The concept of land use compatibility is based on the principle that people tend to be more or less disturbed by noise depending on their activities at any given time. For example, most people place a greater premium on quiet when they are at home than when they are shopping or at work.

TABLE A.2-1 NOISE LEVEL REQUIREMENTS TO PROTECT PUBLIC HEALTH AND WELFARE WITH AN ADEQUATE MARGIN OF SAFETY

EFFECT	LEVEL	AREA
Hearing Loss	DNL 74 dBA +	All areas
Outdoor Activity Interference and Annoyance	DNL 55 dBA +	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis of use
	DNL 59 dBA +	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor Activity Interference and Annoyance	DNL 45 dBA+	Indoor residential areas
	DNL 49 dBA +	Other indoor areas with human activities such as schools, etc.

SOURCE: US Environmental Protection Agency, Office of Noise Abatement and Control, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, March 1974.

In 1977, the Federal Interagency Committee on Urban Noise (FICUN) was established with representatives from the US EPA, Department of Transportation, HUD, DOD, and the VA. In 1980, FICUN promulgated land use compatibility guidelines for DNL. The DNL 65 dBA noise contour was designated as the threshold for significant impact to residential land use and noise-sensitive institutions (e.g., hospitals, nursing homes, schools, cultural activities, auditoriums, and outdoor music shells). Residential land use was classified as compatible with the DNL 55 dBA to DNL 65 dBA range; however, this designation reflected the individual federal agencies' consideration of cost and feasibility factors, past community experiences, and program objectives. It was also indicated that local governments may have different goals or conditions to consider when evaluating these guidelines.[12]

[11] US Environmental Protection Agency, Office of Noise Abatement and Control, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, March 1974.

[12] Federal Interagency Committee on Urban Noise, *Guidelines for Considering Noise in Land Use Planning and Control*, June 1980.

In 1980, the American National Standards Institute (ANSI) issued land use compatibility recommendations that described single-family housing as marginally compatible with noise between DNL 55 dBA and DNL 65 dBA.

A.2.2 ROLE OF LAND USE CONTROLS IN PART 150 PROGRAM

The 14 CFR Part 150 program was founded under the Aviation Safety and Noise Abatement Act of 1979 (ASNA); it allows airport operators to voluntarily submit NEMs and NCPs to the FAA for review and approval. An NCP establishes the measures that an airport operator "has taken" or "has proposed" for the reduction of existing incompatible land uses and the prevention of additional incompatible land uses within the area covered by NEMs. Recommended noise abatement measures fall into three categories:

1. Operational measures – applied at the airfield or to aircraft operations and include changes in runway use or changes in flight-track location.
2. Preventative measures – land use control measures to prevent the introduction of new noise-sensitive land uses within existing and future airport noise contours at sensitive levels; such measures include compatible land use zoning or noise overlay zoning within off-airport noise exposure areas.
3. Remedial (corrective) measures – mitigation measures applied to existing incompatible land uses; such measures include acquisition or sound insulation of noise-sensitive property (e.g., houses, schools, churches, nursing homes, hospitals, and libraries).

With the promulgation of 14 CFR Part 150 in 1985, the FAA adopted land use compatibility guidelines showing the relationship between types of land use and aircraft sound levels. These guidelines, summarized in **Table A.2-2**, show the compatibility parameters based on aircraft noise levels for residential, public (schools, churches, nursing homes, hospitals, libraries), commercial, manufacturing and production, and recreational land uses.

The Part 150 guidelines are the basis for defining areas potentially eligible for federal funding of mitigation through the *Airport Improvement Program (AIP) Handbook*.[13]

All land uses within areas below DNL 65 dBA are considered to be compatible with airport operations. Residential land uses are usually incompatible with noise levels above DNL 65 dBA. In some areas, residential land use may be permitted in the DNL 65 dBA to DNL 70 dBA range with appropriate sound insulation measures implemented. It should be noted that, although historic properties are not identified in the table, the use of the historic properties may be considered under residential, public use, commercial use, manufacturing and production, and recreational.

This assessment does not propose to modify the noise compatibility guidelines set forth in Table A.2-2 in so far as they apply to federal participation in the NCP implementation process. Land use management actions are under local jurisdiction and include areas outside the DNL 65 dBA noise exposure contour. These measures are intended to ensure the protection of areas exposed to the DNL 65 dBA noise exposure contour from developing incompatible uses. Therefore, specific land use controls are implemented at the discretion of local governments. Typically, an airport sponsor does not have the authority to implement local land use controls.

[13] US Department of Transportation, Federal Aviation Administration, Order 5100.38D, *Airport Improvement Program Handbook – Appendix R, Noise Compatibility Planning/Projects*, February 2019.

TABLE A.2-2 LAND USE COMPATIBILITY GUIDELINES – TITLE 14 CODE OF FEDERAL REGULATIONS PART 150

LAND USE	YEARLY DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN DECIBELS					
	BELOW 65	65–70	70–75	75–80	80–85	OVER 85
Residential						
Residential other than mobile homes and transient lodgings	Y	N[1]	N[1]	N	N	N
Mobile home park	Y	N	N	N	N	N
Transient lodgings	Y	N[1]	N[1]	N[1]	N	N
Public Use						
Schools	Y	N[1]	N[1]	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	Y[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
Commercial Use						
Offices, business, and professional	Y	Y	25	30	N	N
Wholesale and retail – building materials, hardware, and farm equipment	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail trade – general	Y	Y	Y[2]	Y[3]	Y[4]	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing general	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining and fishing, resource production, and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y[5]	Y[5]	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusement parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

NOTES:
Y – Yes, land use and related structures are compatible without restrictions.
N – No, land use and related structures are not compatible and should be prohibited.
1 Where the community determines that residential or school uses must be allowed, measures to achieve an outdoor-to-indoor noise level reduction (NLR) of at least 25 A-weighted decibels (dBA) to 30 dBA should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dBA, thus the reduction requirements are often stated as 5, 10, or 15 dBA over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2 Measures to achieve an NLR of 25 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where normal noise level is low.
3 Measures to achieve an NLR of 30 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where normal noise level is low.
4 Measures to achieve an NLR of 35 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where normal noise level is low.
5 Land use is compatible provided that special sound reinforcement systems are installed.
6 Residential buildings require an NLR of 25 dBA.
7 Residential buildings require an NLR of 30 dBA.
8 Residential buildings are not permitted.
SOURCE: Title 14 Code of Federal Regulations Part 150, *Airport Noise Compatibility Planning*.

Land use management measures used for Part 150 purposes include both preventative and remedial (corrective) techniques.

Preventative Land Use Management Techniques

Preventative land use management techniques aim to prevent the introduction of additional noise-sensitive land uses within existing and future airport noise contours. There are two categories of preventative measures: regulatory and policy:

- Regulatory:
  - Compatible Use Zoning: commercial, industrial, or farmland zoning
  - Zoning Changes, Residential Density: large-lot zoning, planned development, multi-family zoning
  - Noise Overlay Zoning: special regulations within high-noise areas
  - Transfer of Development Rights: zoning framework to authorize private sale of development rights to encourage sparse development in high-noise areas
  - Environmental Zoning: environmental protection zoning to support airport land use compatibility
  - Subdivision Regulation Changes: require dedication of noise and avigation easements, plat notes
  - Building Code Changes: require soundproofing in new construction
  - Dedicated Noise and Avigation Easements: require for development permits
  - Fair Disclosure Regulations: require seller to notify buyer of aircraft noise
- Policy:
  - Comprehensive Planning: policies supporting land use compatibility and can involve specific land use plans and policies to guide rezoning, variances, conditional uses, public projects
  - Capital Improvement Programming: public investments that support the airport

Remedial/Corrective Land Use Management Techniques

Remedial land use management techniques aim to remedy existing and projected future unavoidable noise impacts in existing areas of incompatible land use. Remedial land use management techniques are classified in one of two general categories: modify existing use and maintain existing use. Remedial measures include the following:

- Modify Existing Use:
  - Guaranteed Purchase (Fee Simple): outright purchase of property with the intent of removing incompatible use by demolition of structure
  - Development Rights Purchase: purchase of rights to develop property
  - Land Banking: acquisition of vacant land for long-term airport facility needs
  - Redevelopment: acquisition and redevelopment of property
- Maintain Existing Use:
  - Purchase Assurance: airport sponsor acts as buyer of last resort, sound insulates house, sells property, retains easement

- Sales Assistance: airport sponsor sound insulates house; guarantees that the property owner will receive the appraised value, or some increment thereof, regardless of final sales value that is negotiated with a buyer; retains easement
- Sound Attenuation: sound insulation of houses and noise-sensitive public facilities; retains easement
- Noise and Avigation Easement Purchase: purchase of easement only

A.2.3 FEDERAL AVIATION ADMINISTRATION POLICY ON PART 150 NOISE MITIGATION MEASURES

The FAA released a final policy to establish the differences between remedial and preventative noise mitigation measures proposed by airport operators under noise compatibility planning regulations. In the notice of final policy effective October 1, 1998, the FAA indicated the following:

> As of October 1, 1998, the FAA will approve, under 14 CFR Part 150, only remedial noise mitigation measures for existing incompatible development, and only preventative noise mitigation measures in areas of potential new incompatible development. The FAA will not approve remedial noise mitigation measures for new incompatible development that occurs in the vicinity of airports. The use of AIP funds will be affected to the extent that such use depends on approval under Part 150.[14]

The 14 CFR Part 150 NCP was established under the ASNA. According to the ASNA, an NCP establishes the measures that an airport operator has taken or has proposed for the reduction of existing incompatible land uses and the prevention of additional incompatible land uses within the area covered by NEMs. The Part 150 program allows airport operators to submit NEMs and NCPs to the FAA voluntarily. Airport operators may opt to submit NEMs without preparing and submitting an NCP. The types of measures that airport operators may include in an NCP are not limited by the ASNA, allowing airport operators to submit a comprehensive range of measures, including innovative measures that address local needs and circumstances.

The criteria for approval or disapproval of measures submitted in a Part 150 program are found in the ASNA. The ASNA directs the federal approval of an NCP, except for measures relating to flight procedures: (1) if the program measures do not create an undue burden on interstate or foreign commerce; (2) if the program measures are reasonably consistent with the goal of reducing existing incompatible land uses and preventing the introduction of additional incompatible land uses; and (3) if the program provides for its revision if necessitated by the submission of a revised NEM. Failure to approve or disapprove an NCP within 180 days, except for measures relating to flight procedures, is deemed to be an approval under the ASNA. Finally, the ASNA establishes benchmarks under which grants may be made to carry out noise compatibility projects, consistent with the ASNA's overall deference to local initiative and flexibility.

The FAA is authorized, but not obliged, to fund projects via the AIP to carry out measures in an NCP that are not disapproved by the FAA. Such projects also may be funded with local PFC revenue upon FAA approval of an application filed by a public agency that owns or operates a commercial service airport, although the use of PFC revenue for such projects does not require an approved NCP under Part 150.

[14] US Department of Transportation, Federal Aviation Administration, https://www.faa.gov/about/office_org/headquarters_offices/apl/noise_emissions/planning_toolkit/media/II.E.pdf (accessed October 8, 2021).

The ASNA did not change the legal authority of state and local governments to control the uses of land within state and local jurisdictions. Public controls on the use of land are commonly exercised by zoning. Zoning is a power reserved to the states under the US Constitution. It is an exercise of the police powers of the states that designates the uses permitted on each parcel of land. This power is usually delegated in state-enabling legislation to local levels of government. Many local land use control authorities (cities, counties, etc.) have not adopted zoning ordinances or other controls to prevent incompatible development (primarily residential) within the noise impact areas of airports. An airport noise impact area, identified within noise contours on an NEM, may extend over several different local jurisdictions that individually control land uses. While airport operators have included measures in NCPs submitted under Part 150 to prevent the development of new incompatible land uses through zoning and other controls under the authorities of appropriate local jurisdictions, success in implementing these measures has been mixed.

One or more of the factors hindering effective land use controls may be of sufficient importance to preclude some jurisdictions from following through on the land use recommendations of an airport Part 150 NCP. When an airport sponsor or a non-airport sponsor jurisdiction allows additional incompatible development within the airport noise impact area, it can result in noise problems for the people who move into the area. This can result in noise problems for the airport operator in the form of noise nuisance lawsuits, public opposition to proposals by the airport operator to expand airport capacity, and local political pressure for airport operational and capacity limitations to reduce noise.

Some airport operators have taken the position that they will not provide any financial assistance to mitigate aviation noise for new incompatible development. Other airport operators have determined that it is a practical necessity for them to include at least some new residential areas within their noise assistance programs to mitigate noise impacts that they were unable to initially prevent. The distinctions between what is "new" and what is "existing" residential development with respect to airport noise issues are distorted.

Airport operators may include new incompatible land uses, as well as existing incompatible land uses, within their Part 150 NCPs and recommend remedial noise mitigation measures such as property acquisition or noise insulation. These measures have been considered to qualify for approval by the FAA under 49 US Code 47504 and 14 CFR Part 150. The Part 150 approval allows noise mitigation measures to be considered for federal funding under the AIP, although it does not guarantee that federal funds will be provided.

Final Policy

The pertinent language of the FAA's Final Policy on Part 150 noise mitigation actions is as follows:

> Beginning October 1, 1998, the FAA will approve remedial noise mitigation measures under Part 150 only for incompatible development, which exists as of that date. Incompatible development that potentially occurred on or after October 1, 1998, may only be addressed in Part 150 programs with preventative noise mitigation measures. This policy will affect the use of AIP funds to the extent that such funding is dependent on approval under Part 150. Approval of remedial noise mitigation measures for bypassed lots or additions to existing structures within noise impacted neighborhoods, additions to existing noise impacted schools or other community facilities required by demographic changes within the service areas, and formerly noise compatible uses that have been rendered incompatible as a result of airport expansion or changes in airport operations, and other reasonable exceptions to this policy on similar grounds must be justified by

airport operators in submittals to the FAA and will be considered by the FAA on a case-by-case basis. This policy does not affect AIP funding for noise mitigation projects that do not require Part 150 approval, that can be funded with PFC revenue, or that are included in FAA-approved environmental documents for airport development.[15]

A.2.4 STATE OF HAWAII LAND USE GUIDELINES

The DOT-A considers other noise compatibility and noise standards in addition to the FAA's aircraft and noise land use compatibility standards due to the outdoor lifestyle of the people and because most of Hawaii's residential structures are naturally ventilated. The outdoor-to-indoor sound reduction of these residential structures is moderately low (9 dBA), thus the exterior noise level of DNL 65 dBA does not eradicate all the risks of adverse noise impacts. The other noise compatibility standards are summarized as follows:

- US EPA 550/9-74-004 recommends that an exterior noise level of DNL 55 dBA is considered as "Unconditionally Acceptable or Near-Zero Risk."
- American National Standards Institute (ANSI) S3.23-1980 recommends "to incorporate the lower outdoor-to-indoor NLR characteristics of naturally ventilated structures and provide additional weight to extensive outdoor land uses."
- Federal Housing Authority (FHA) / HUD and the US Department of Veterans Affairs (VA) acknowledge that noise levels between DNL 55 dBA and DNL 65 dBA have an adverse impact on communities. However, due to the cost and feasibility to enforce the DNL 55 dBA, the DNL 65 dBA has been selected as the regulatory standard.

As a result of reviewing all available noise compatibility standards, the DOT-A established a compromise between the near-zero risk level of DNL 55 dBA and the significant risk of DNL 65 dBA for naturally ventilated structures. The DOT-A established stringent local land use compatibility guidelines and recommended that an aircraft noise limit of DNL 60 dBA should be used as a planning level for noise-sensitive land uses involving naturally ventilated structures, such as residential and public use (e.g., schools, libraries, churches, clinics, and meeting rooms). **Table A.2-3** summarizes the local land use compatibility guidelines.[16,17,18]

The 1989 Lihue Airport 14 CFR Part 150 NEM and NCP Study noted that the DOT-A consulted with the FAA to determine if the noise mitigation measures in areas subject to noise levels between DNL 60 dBA to DNL 65 dBA would be eligible for federal funding under the Part 150 NCP. According to the FAA's Honolulu District Office, the recommended noise mitigation measures are subject to specific case-by-case review for federal funding requests.

For this NEM Update study, both the FAA guidelines and State recommended land use guidelines have been used to identify compatible and incompatible land uses.

[15] US Department of Transportation, Federal Aviation Administration, https://www.faa.gov/about/office_org/headquarters_offices/apl/noise_emissions/planning_toolkit/media/II.E.pdf (accessed October 8, 2021).

[16] Hawaii Revised Statutes 205-2, Districting and Classification of Lands.

[17] State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Program: Volume I- Noise Exposure Map Report and Volume II-Noise Compatibility Program Report*, 1989.

[18] State of Hawaii, Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Update,* April 2013.

TABLE A.2-3 LAND USE COMPATIBILITY GUIDELINES – STATE OF HAWAII

LAND USE	YEARLY DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN DECIBELS					
	BELOW 60	60–65	65–70	70–75	75–80	80–85
Residential						
Low density residential, resorts, and hotels (outdoor facility)	Y[1]	N[2]	N	N	N	N
Low density apartment with moderate outdoor use	Y	N[2]	N	N	N	N
High density apartment with limited outdoor use	Y	N[2]	N[2]	N	N	N
Transient lodgings with limited outdoor use	Y	N[2]	N[2]	N	N	N
Public Use						
Schools, day-care centers, libraries, and churches	Y	N[3]	N[3]	N[3]	N	N
Hospitals, nursing homes, clinics, and health facilities	Y	Y[4]	Y[4]	Y[4]	N	N
Indoor auditoriums and concert halls	Y[3]	Y[3]	N	N	N	N
Governmental services and office buildings serving the general public	Y	Y	Y[4]	Y[4]	N	N
Transportation and parking	Y	Y	Y[4]	Y[4]	Y[4]	Y[4]
Commercial Use and Government Use						
Offices – government, business, and professional	Y	Y	Y[4]	Y[4]	N	N
Wholesale and retail – building materials, hardware, and heavy equipment	Y	Y	Y[4]	Y[4]	Y[4]	Y[4]
Airport businesses – car rental, tours, lei stands, ticket offices, etc.	Y	Y	Y[4]	Y[4]	N	N
Retail, restaurants, shopping centers, financial institutions, etc.	Y	Y	Y[4]	Y[4]	N	N
Power plants, sewage treatment plants, and base yards	Y	Y	Y[4]	Y[4]	Y[4]	N
Studios without outdoor sets, broadcasting, production facilities, etc.	Y[3]	Y[3]	N	N	N	N
Manufacturing, Production, and Storage						
Manufacturing, general	Y	Y	Y[4]	Y[4]	Y[4]	N
Photographic and optical	Y	Y	Y[4]	Y[4]	N	N
Agriculture (except livestock) and forestry	Y	Y[5]	Y[5]	Y[5]	Y[5]	Y[5]
Livestock farming and breeding	Y	Y[5]	Y[5]	N	N	N
Mining and fishing, resource production, and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y[6]	Y[6]	N	N	N
Outdoor music shells, amphitheaters	Y[6]	N	N	N	N	N
Nature exhibits and zoos, neighborhood parks	Y	Y	N	N	N	N
Amusements parks, beach parks, active playgrounds, etc.	Y	Y	Y	Y	N	N
Public golf courses, riding stables, cemeteries, gardens, etc.	Y	N	N	N	N	N
Professional/resort sport facilities, locations of media events, etc.	Y[6]	N	N	N	N	N
Extensive natural wildlife and recreation areas	Y[6]	N	N	N	N	N

NOTES:

Y – Yes, land use and related structures are compatible without restrictions.

N – No, land use and related structures are not compatible and should be prohibited.

1 A noise level of DNL 60 dBA does not eliminate all risks of adverse noise impacts from aircraft noise. However, the DNL 60 dBA planning level has been selected by the State of Hawaii, Department of Transportation – Airports Division as an appropriate compromise between the minimal risk level of DNL 55 dBA and the significant risk level of DNL 65 dBA.

2 Where the community determines that these uses must be allowed, noise level reduction (NLR) measures to achieve interior levels of DNL 45 dBA or less should be incorporated into building codes and be considered in individual approvals. Normal local construction employing natural ventilation can be expected to provide an average NLR and will not eliminate outdoor noise problems.

3 Because the DNL descriptor system represents a 24-hour average of individual aircraft noise events, each of which can be unique in respect to amplitude, duration, and tonal content, the NLR requirements should be evaluated for the specific land use, interior acoustical requirements, and properties of the aircraft noise events. NLR requirements should not be based solely upon the exterior DNL exposure level.

4 Measures to achieve the required NLR must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

5 Residential buildings require an NLR. Residential buildings should not be located where noise is greater than DNL 65 dBA.

6 The impact of amplitude, duration, frequency, and tonal content of aircraft noise events should be evaluated.

SOURCE: Hawaii Revised Statutes 205-2, *Districting and Classification of Lands*; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Plan, Volume 1, Noise Exposure Map Report*, May 1989; State of Hawaii, Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Update,* April 2013.

Table A.2-4 summarizes the general deviations of the State's recommended land use guidelines from the FAA land use compatibility guidelines.

TABLE A.2-4 SUMMARY OF DEVIATIONS OF THE STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION – AIRPORTS DIVISION RECOMMENDED LAND USE GUIDELINES FROM THE FAA LAND USE GUIDELINES

DOT-A RECOMMENDED GUIDELINES
Land Use Category Recommendations
Residential land use category is delineated into low density and high density.
Additional land use categories included under recreation: professional/resort sport facilities, locations of media events, extensive natural wildlife, and recreation areas.
Noise Level and Noise Level Reduction (NLR) Recommendations
Criteria of yearly DNL ranges in DOT-A recommended guidelines are below DNL 60 dBA to DNL 85 dBA in lieu of below DNL 65 dBA to over DNL 85 dBA in FAA guidelines.
NLR should achieve interior levels of DNL 45 dBA or less into building codes and be considered in individual approvals. Normal local construction can be expected to provide an average NLR of approximately 9 dBA.
NLR requirements should be evaluated and not be based solely upon the exterior DNL exposure level for schools, indoor auditoriums, concert halls, studios without outdoor sets, broadcasting, and production facilities.
No indication of dBA measurement to achieve required NLR for the design and construction of buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

NOTES:
DNL – Day-Night Average Sound Level
dBA – A-Weighted Decibels
NLR – Noise Level Reduction
SOURCES: Hawaii Revised Statutes 205-2, *Districting and Classification of Lands*; State of Hawaii Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Update*, April 2013; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Plan, Volume 1, Noise Exposure Map Report*, May 1989; Ricondo & Associates, October 2021.

A.2.5 STATE OF HAWAII LAND USE CONTROLS

Land use on the island of Kauai is controlled by the State of Hawaii Land Use Commission (LUC) and the County of Kauai, through its Planning Department.

State Land Use

The Land Use Law, Hawaii Revised Statutes (HRS), Chapter 105, established a framework of land use management and regulation that all lands in the state of Hawaii are designated into one of the four land use districts: Agricultural, Rural, Urban, and Conservation. To manage the Land Use Law, the State Legislature established the LUC, which comprises nine members, one member appointed from each of the four counties and five members who are appointed at-large.[19]

Lihue Airport and its environs are within the state's Urban, Agricultural, and Conservation districts.[20]

[19] State of Hawaii, https://luc.hawaii.gov/about/ (accessed October 8, 2021).

[20] State of Hawaii, https://histategis.maps.arcgis.com/apps/webappviewer/index.html?id=b843c728b4cb4333b1df015fdaa84104 (accessed October 8, 2021).

Kauai County Planning

The Long-Range Planning Division manages Kauai County's planning program and is responsible for the implementation of the Kauai County General Plan (General Plan), community development plans, and other related plans. The General Plan was updated in 2018 and adopted by Ordinance No. 1025. The General Plan serves as a guide to "improve the physical environment and quality of life for the people of Kauai and to address the overall development of the island."[21,22]

Kauai County has six planning districts; each district has a Community Plan that is designed to implement the General Plan. The Community Plan for Lihue was updated in 2015 and adopted by Ordinance No. 989.[23]

The Regulatory Planning Division manages the zoning and subdivision ordinances that control the land use in Kauai County. The Comprehensive Zoning Ordinance establishes the land districts, delineates the types of permitted uses in the districts, and provides regulations for land development and construction of buildings/structures. The Subdivision Ordinance provides standards for the subdivision of land in Kauai County and ensures new development is compatible with the overall character of the island.[24]

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[21] County of Kauai, https://www.kauai.gov/Government/Departments-Agencies/Planning-Department/Long-Range-Division (accessed October 8, 2021).

[22] SSFM International, Inc., *Kauai Kakaou: Kauai County General Plan*, 2018.

[23] SSFM International, Inc., *Lihue Community Plan*, June 2015.

[24] County of Kauai, https://www.kauai.gov/Government/Departments/Planning-Department/Zoning-Land-Use-Permits (accessed October 8, 2021).

APPENDIX B

Federal Aviation Administration Concurrence and Approval Requests

APPENDIX B.1

Use of 2019 to Represent Existing Conditions and Application of LIH Forecast for Title 14 CFR Part 150 Noise Exposure Map Update

U.S. Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Airports District Office

300 Ala Moana Blvd, Rm. 7-128
Honolulu, HI 96813
MAIL: Box 50244
Honolulu, HI 96850-0001
Telephone: (808) 312-6028
FAX: (808) 312-6048

January 21, 2022

Mr. Ross M. Higashi
Deputy Director
State of Hawaii, Department of Transportation, Airports Division
400 Rodgers Boulevard, Suite 700
Honolulu, Hawaii 96819-1880

Subject: Federal Aviation Administration Response to the Lihue Airport Noise Exposure Map Update Methodology Request (AIR-EP 21.0114)

Dear Mr. Higashi:

The Federal Aviation Administration (FAA) has reviewed your request, dated December 1, 2021, to modify the methodology to develop Noise Exposure Maps (NEM) for Lihue Airport (LIH) in support of LIH's Noise Compatibility Program. The COVID pandemic has depressed the level of operations at LIH. FAA understands that the Hawaii Department of Transportation-Airports Division (HDOT-A) contends that development of an updated NEM for the airport utilizing current year operations would not be a true reflection of the normal, pre-pandemic level of operations at LIH. Your proposed modification would be to utilize LIH operational data from 2019, which would represent pre-pandemic operational levels, combined with the information in the *LIH Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts Report* as a proxy for utilizing current year operational data.

The FAA concurs with your proposed modification for LIH so that HDOT-A can move forward in the development of LIH's NEMs.

Please ensure that your justification to modify the NEM methodology is fully explained and contained in the LIH's NEM update submission for FAA's review. You are also reminded that the FAA's approved model for the development of NEMs is the Aviation Environmental Design Tool (AEDT). Information on the latest version of AEDT can be found at the following website: https://aedt.faa.gov/.

Sincerely,

Gordon K. Wong
Manager, Airports District Office

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDWIN H. SNIFFEN

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION
400 RODGERS BOULEVARD, SUITE 700
HONOLULU, HAWAII 96819-1880

IN REPLY REFER TO:
AIR-EP
21.0114

December 1, 2021

Mr. Gordon K. Wong
Airports District Office Manager
Federal Aviation Administration
P.O. Box 50244
Honolulu, Hawaii 96850

Dear Mr. Wong:

Subject: Lihue Airport Noise Exposure Map Update Methodology and Forecast Review

The State of Hawaii, Department of Transportation, Airports Division (DOT-A), hereby requests to obtain the Federal Aviation Administration's (FAA) approval on the methodology and aviation activity forecast to be used for the Lihue Airport (LIH) Noise Exposure Map (NEM) Update. The data collection and preliminary analysis for this NEM Update was initiated in mid-2020. The proposed existing base case condition is 2019 and the future base case condition is 2027, which is at least 5-years from the year the NEM is anticipated to be submitted to FAA for review. The following summarizes the reasoning for the study years selected and to confirm the sensitivity assessment conducted for the LIH Master Plan Forecast remains applicable for this NEM Update.

Existing Base Case Condition – 2019

The aviation activity forecast prepared for the LIH Master Plan (Master Plan Forecast) was completed in March 2020, just at the beginning of the COVID-19 pandemic and documented in the *LIH Airport Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts* report (Forecast Report). The uncertainties documented in the Forecast Report related to the severity and duration of the contraction in aviation activity resulting from the COVID-19 pandemic remains pertinent and valid. While the United States has shown signs of recovery, other countries and economies in the world remained affected by widespread infections and slower vaccination rates.

Operations have dropped off substantially at LIH since the onset of the COVID-19 pandemic; however, this drop-off is assumed to be temporary, similar to the effects on the aviation industry following the terrorist attacks on September 11, 2001, and impacts to aircraft operations after Hurricane Iniki in September 1992. The FAA 2020 Terminal Area Forecast (TAF) released in May 2021 (FAA 2020 TAF), includes the recovery of aviation activity from the COVID-19 pandemic. The TAF reflects a 13 percent Compound Annual Growth Rate (CAGR) between

2020 and 2025, representing a high growth rate compared to typical historical growth rates after previous impactful events. Based on the TAF, recovery is expected to occur within the next 4 years.

Due to the temporary effects from the COVID-19 pandemic and potential for substantial growth to pre-pandemic levels between 2020 and 2025, it was determined that 2019 serves as a reasonable representation of existing conditions for the purposes of the NEM Update. This approach of applying a different year to represent existing conditions has been previously applied when an airport experienced runway closures or other events that affected operation levels, runway use, and flight track use throughout a given year. When a runway closure occurred for a long-period of time in a year, the year was determined not be a reasonable representation of existing conditions; therefore, a year prior was considered. Use of the 2019 data to represent existing conditions, instead of 2020 or any years within the recovery period, follows the same logic.

Future Base Case Condition - 2027

In the FAA 2020 TAF, FAA noted: "There is uncertainty associated with the forecasts because of the uncertainty regarding the path of the [COVID-19] pandemic and its economic impacts. Particular attention was spent on forecasting the near term recovery back to 2019 activity." According to the FAA 2020 TAF, aircraft operations will approach 2019 levels again by 2025. A comparison of the Master Plan forecast, previously approved by the FAA, and the FAA 2020 TAF between 2025 and 2027 indicates that the Master Plan forecast is within 10 percent of the FAA 2020 TAF; within the FAA's variance criteria for the five-year forecast period to be considered consistent with the FAA TAF.[1] **Table 1** includes the Master Plan forecast and FAA TAF annual total operations and the variance between the two forecasts.

TABLE 1 LIH MASTER PLAN FORECAST AND 2020 FAA TERMINAL AREA FORECAST COMPARISON

YEAR	MASTER PLAN FORECAST	2020 FAA TAF	VARIANCE (%)
2025	143,020	132,270	8
2026	144,198	136,168	6
2027	145,378	138,792	5

SOURCES: Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts*, March 2020; Federal Aviation Administration, 2020 Terminal Area Forecast, May 2021.

[1] Federal Aviation Administration, https://www.faa.gov/airports/planning_capacity/media/approval_local_forecasts_2008.pdf (accessed October 11, 2021).

As shown in Table 1, the variance between the Master Plan Forecast and the FAA 2020 TAF decreases from 2025 to 2027; therefore, the Master Plan Forecast operations for 2027, representing at least 5 years from the date of submittal of the NEM to the FAA (Checklist III[A] and III[B][3]), are considered appropriate for use in this 14 CFR Part 150 NEM Update Study. Due to the difficulty in forecasting the impacts caused by the COVID-19 pandemic, it is uncertain as to what year the forecast operation levels will occur, but based on both forecasts, it seems reasonable to assume the Master Plan forecast operation levels for 2027 represent operation levels at least five years from when the NEM Update report is submitted to FAA for review.

The DOT-A respectfully requests FAA's prompt review to the LIH Noise Exposure Map Update methodology in selecting the study years and the forecast sensitivity analysis used to support the LIH Master Plan Forecast for the LIH NEM Update noise analysis. Please contact Mr. Herman Tuiolosega, DOT-A Head Planner, at (808) 838-8810 or herman.tuiolosega@hawaii.gov or Mr. Raymond Severn, DOT-A Project Manager, at (808) 838-8817 or raymond.s.severn@hawaii.gov, with any questions or for further coordination.

Sincerely,

ROSS M. HIGASHI
Deputy Director – Airports

c: Ms. Ura Yvan, Director, Ricondo & Associates, Inc.

APPENDIX B.2

Federal Aviation Administration Approval of Forecast

U.S. Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Airports District Office

300 Ala Moana Blvd., Rm. 7-128
Honolulu, HI 96813
MAIL: Box 50244
Honolulu, HI 96850-0001
Telephone: (808) 312-6028
FAX: (808) 312-6048

September 30, 2020

Mr. Ross Higashi
Deputy Director - Airports Division
State of Hawaii, DOT
400 Rodgers Blvd., Suite 700
Honolulu, Hawaii 96819-1880

Dear Mr. Higashi:

SUBJECT: Aviation Forecast Approval - Lihue Master Plan

We acknowledge receipt of your letter dated June 10, 2020 (AIR-EP 20.0069) requesting approval of the Baseline Forecast for inclusion in the Airport Master Plan for Lihue Airport (LIH). The Federal Aviation Administration (FAA), Airports District Office has reviewed the aviation forecast for the Lihue Airport (LIH) master plan and Noise Exposure Map Update – Aviation Activity Forecast dated March 2020. The FAA approves these forecasts for airport planning purposes. The FAA approval is based on the following:

1. The forecast was prepared in 2019 using 2018 as the base year. The baseline forecast of enplaned passengers are projected to grow from 1.7 million in 2018 to 2.2 million in 2038, a compound annual growth rate (CAGR) of 1.4 percent. Total aircraft operations are forecasted to grow at a CAGR of 1.0 percent over the planning horizon, increasing from 130,278 in 2018 to 158,454 in 2038. The difference between the FAA Terminal Area Forecast (TAF) and Lihue Airport's forecast for total enplanements, based aircraft, and operations is within the 10 percent and 15 percent allowances for the 5 and 10 year planning horizon.
2. The forecast is based on current data and appropriate methodologies.
3. The forecast acknowledges recent Southwest Airlines capacity on future passenger and operations projections.
4. The forecast considered local community interests through Technical Advisory committee and public meetings held in 2019.
5. The forecast acknowledges COVID-19 uncertainties.

The approval of the forecast does not automatically constitute a commitment on the part of the United States to participate in any development recommended in the master plan or shown on the ALP. All future development will need to be justified by current activity levels at the time or proposed implementation. Further, the approved forecasts may be subject to additional analysis or the FAA may request a sensitivity analysis if this data is to be used for environmental or Part 150 noise planning purposes.

If you have any questions about this forecast approval, please call me at (808) 312-6033.

Sincerely,

kimberly evans

Kimberly Evans, Community Planner

DAVID Y. IGE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
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IN REPLY REFER TO:
AIR-EP
20.0069

June 10, 2020

Mr. Gordon K. Wong
Airports District Office Manager
Federal Aviation Administration
Western-Pacific Region
P. O. Box 50244
Honolulu, Hawaii 96850

Dear Mr. Wong:

Subject: State of Hawaii, Department of Transportation, Airports Division (HDOT-A), Activity Forecast Review for Lihue Airport

Enclosed is a forecast of aviation activity for review by the Federal Aviation Administration (FAA). The forecast was prepared in support of the Lihue Airport (LIH) Master Plan Update (MPU) and presents activity over a 20-year planning horizon, up to year 2038. The forecast was prepared in 2019 using calendar year (CY) 2018 as the base year. While 2018 serves as the base year, the forecast incorporates actual 2019 activity and actual schedules for part of 2020, including forward-looking schedules. The short-term capacity growth announced in late 2019 and early 2020 by Southwest Airlines has been incorporated into the short-term projections. The attached report details the methodology, analysis, and conclusions reached as part of the forecast development. Additionally, the tables included with this transmittal letter provide a comparison of the enplaned passenger and aircraft operation forecasts to the FAA's 2019 Terminal Area Forecast (TAF).

The following summarizes the forecast development.

- The initial forecast, identified as Scenario A and described in Section 3.3.2.1 of the report, includes an estimation of O&D (origin and destination) passengers based on socioeconomic regression analysis using both local data (Kauai General Plan and Department of Business, Economic Development & Tourism [DBEDT] State of Hawaii Data Book) and national socioeconomic data (Woods & Poole Inc.).

- Several concerns were raised by the local community from various Technical Advisory Committees and public meetings held on July 12, 2019 and October 30, 2019.

- Continued increases in Airport activity would further strain existing infrastructure and natural resources on the Island of Kauai.

    - Considerations: While the forecast is attempting to project the demand regardless of whether there is infrastructure, the master plan attempts to assess if the airport is ready to meet that demand. Consideration was given to aligning with local dynamics affecting air travel demand and local socioeconomic data sources were used in the development of the forecasts (report Section 3.3.2.2). Once the Master Plan Update is complete, it will be sent to the Legislators to review and initiate action/response to the island impacts.

- Determining the future number of visitors to Kauai should not be done in a vacuum and should reflect the direction set forth in the County of Kauai General Plan, the Kauai Tourism Strategic Plan, the County of Kauai Multi-modal Land Transportation Plan, the County of Kauai Short-Range Transit Plan, and the Wailua-Kapaa Highway Short-Range Improvement Plan.

    - Considerations: Additional sources such as the Kauai Tourism Strategic Plan and the County of Kauai Short-Range Shuttle Plan were considered (report Section 3.3.2.2). However, these sources already use the socioeconomic projections from the Kauai General Plan as a basis for their projections and those projections were used in the development of the forecast.

- To address these concerns, a second forecast scenario, identified as Scenario B in Section 3.3.2.2 of the report, was prepared which uses only local socioeconomic variables from the Kauai General Plan and the DBEDT data (removing the national data sources from the analysis). Additionally, the selected variables in Scenario B were identified due to their conservative forecast growth rates and relationship to tourism activity levels on the island, such as Kauai County visitor days by air, and visitor units in Kauai County.

Scenario B was adopted as the baseline forecast. The Scenario A forecast was retained as a high-scenario forecast. In the baseline (Scenario B) forecast, enplaned passengers are projected to grow from 1.7 million in 2018 to 2.2 million in 2038, a compound annual growth rate (CAGR) of 1.4 percent. Total aircraft operations are forecast to grow at a CAGR of 1.0 percent over the planning horizon, increasing from 130,278 in 2018 to 158,454 in 2038. Both are presented in **Table 1**, included with this transmittal letter. **Table 2** provides a comparison of the baseline forecast to the 2019 FAA TAF.

We respectfully request FAA's review of the LIH MPU forecast of aviation activity and the consideration of the impact of the recent Southwest Airlines capacity on future passenger and operations projections. Please contact Mr. Herman Tuiolosega, HDOT-A Head Planner, at (808) 838-8810 or herman.tuiolosega@hawaii.gov, or Mr. Raymond Severn, HDOT-A Project Manager, at (808) 838-8817 or raymond.s.severn@hawaii.gov, with any questions you may have.

Sincerely,

JADE T. BUTAY
Director of Transportation

Enclosures

TABLE 1 (1 OF 2) FORECAST SUMMARY

	FORECAST LEVELS AND GROWTH RATES						AVERAGE COMPOUND ANNUAL GROWTH RATES				
	BASE YEAR (2018)[1]	BASE + 1 (2019)	BASE + 5 (2023)	BASE + 10 (2028)	BASE + 15 (2033)	BASE + 20 (2038)	BASE +1 (2019)	BASE +5 (2023)	BASE +10 (2028)	BASE +15 (2033)	BASE + 20 (2038)
Passenger Enplanements											
Air Carrier	1,702,290	1,649,081	1,995,347	2,083,250	2,166,094	2,236,748	-3.1%	3.2%	2.0%	1.6%	1.4%
Commuter[2]	0	0	0	0	0	0	-	-	-	-	-
Total Enplanements	1,702,290	1,649,081	1,995,347	2,083,250	2,166,094	2,236,748	-3.1%	3.2%	2.0%	1.6%	1.4%
Operations											
Itinerant											
Air Carrier (incl. Air Cargo)	27,412	28,086	33,192	34,101	34,892	35,455	2.5%	3.9%	2.2%	1.6%	1.3%
Commuter/Air Taxi	78,858	79,647	82,881	87,108	91,552	96,222	1.0%	1.0%	1.0%	1.0%	1.0%
Total Commercial Operations	106,270	107,733	116,073	121,209	126,444	131,677	1.4%	1.8%	1.3%	1.2%	1.1%
General Aviation	6,326	6,242	6,287	6,343	6,398	6,592	-1.3%	-0.1%	0.0%	0.1%	0.2%
Military	1,797	1,797	1,797	1,797	1,797	1,797	0.0%	0.0%	0.0%	0.0%	0.0%
Local											
General Aviation	15,464	15,679	16,165	16,790	17,438	17,967	1.4%	0.9%	0.8%	0.8%	0.8%
Military	421	421	421	421	421	421	0.0%	0.0%	0.0%	0.0%	0.0%
Total Operations	130,278	131,871	140,742	146,561	152,497	158,454	1.2%	1.6%	1.2%	1.1%	1.0%
Instrument Operations	74,253	75,365	82,264	85,516	88,766	91,911	1.5%	2.1%	1.4%	1.2%	1.1%
Peak Hour Operations	33	33	35	36	37	39	1.0%	1.2%	0.9%	0.8%	0.8%

TABLE 1 (2 OF 2) FORECAST SUMMARY

	FORECAST LEVELS AND GROWTH RATES						AVERAGE COMPOUND ANNUAL GROWTH RATES				
	BASE YEAR (2018)[1]	BASE + 1 (2019)	BASE + 5 (2023)	BASE + 10 (2028)	BASE + 15 (2033)	BASE + 20 (2038)	BASE +1 (2019)	BASE +5 (2023)	BASE +10 (2028)	BASE +15 (2033)	BASE + 20 (2038)
Cargo											
Cargo/mail (tons)[3]	23,524	24,235	27,795	32,004	36,221	39,479	3.0%	3.4%	3.1%	2.9%	2.6%
Based Aircraft											
Single Engine (Nonjet)	19	19	21	21	21	21	0.0%	2.0%	1.0%	0.7%	0.5%
Multi Engine (Nonjet)	5	5	5	5	5	5	0.0%	0.0%	0.0%	0.0%	0.0%
Jet Engine	0	0	0	0	0	---	---	---	---	---	---
Helicopter	22	22	24	27	29	30	0.0%	1.8%	2.1%	1.9%	1.6%
Other	0	0	0	0	0	---	---	---	---	---	---
Total	46	46	50	53	55	56	0.0%	1.7%	1.4%	1.2%	1.0%
Operational Factors											
Average Aircraft Size (seats)											
Single Engine (Nonjet)	19	19	21	21	21	21	---	---	---	---	---
Multi Engine (Nonjet)	5	5	5	5	5	5	---	---	---	---	---
Average Enplaning Load Factor											
Air Carrier	79%	80%	80%	80%	81%	81%	---	---	---	---	---
Commuter	---	---	---	---	---	---	---	---	---	---	---
General Aviation Operations per Based Aircraft	474	477	449	436	433	439	---	---	---	---	---

NOTES:

1 Forecast prepared on a calendar year basis.

2 Commuter as defined by FAA. Commuter operations include takeoff and landings by aircraft with 60 or fewer seats that transport regional passengers on scheduled commercial flights.

3 Cargo/mail in total U.S. tons (enplaned and deplaned).

SOURCES: Federal Aviation Administration (Template); Hawaii Department of Transportation (Historical); Federal Aviation Administration, Air Traffic Activity Data System (ATADS); U.S. Department of Transportation, Form T-100 (Historical), August 2019; Ricondo & Associates, Inc. (Forecast), August 2019.

TABLE 2 COMPARISON TO TERMINAL AREA FORECAST

	YEAR[1]	MPU FORECAST BASELINE	2019 FAA TAF	BASELINE VS. FAA TAF (% DIFFERENCE)
Passenger Enplanements[2]				
Base year	2018	1,702,290	1,623,358	4.9%
Base year + 5 years	2023	1,995,347	1,867,568	6.8%
Base year + 10 years	2028	2,083,250	2,010,574	3.6%
Base year + 15 years	2033	2,166,094	2,190,613	-1.1%
Base year + 20 years	2038	2,236,748	2,383,338	-6.2%
Commercial Operations				
Base year	2018	106,270	109,885	-3.3%
Base year + 5 years	2023	116,073	114,533	1.3%
Base year + 10 years	2028	121,209	121,138	0.1%
Base year + 15 years	2033	126,444	128,524	-1.6%
Base year + 20 years	2038	131,677	136,343	-3.4%
Total Operations				
Base year	2018	130,278	134,317	-3.0%
Base year + 5 years	2023	140,742	138,719	1.5%
Base year + 10 years	2028	146,561	146,144	0.3%
Base year + 15 years	2033	152,497	154,391	-1.2%
Base year + 20 years	2038	158,454	163,113	-2.9%

NOTES:

1 The MPU forecast presented in calendar year. Federal Aviation Administration TAF presented in federal fiscal year (October–September).

SOURCES: Federal Aviation Administration (Template); Hawaii Department of Transportation; Federal Aviation Administration, Air Traffic Activity Data System (ATADS); Federal Aviation Administration, 2019 TAF; U.S. Department of Transportation, Form T-100 (Historical), August 2019; Ricondo & Associates, Inc. (Forecast), August 2019.

RICONDO®

March 2020

Lihue Airport

Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts

Prepared for:

Hawaii Department of Transportation, Airports Division (DOT-A)

Prepared by:

RICONDO

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3. AVIATION ACTIVITY FORECASTS

This report presents an analysis of historical aviation activity at Lihue Airport (LIH or the Airport). It summarizes the forecasts of future activity through calendar year (CY) 2038. Forecasts are provided for enplaned passengers, aircraft operations, and cargo volumes, which serve as the basis for determining facility requirements and for conducting environmental, financial, and other analyses.

The forecasts were prepared using CY 2018 as the base year, the latest year for which complete passenger, operations, and cargo volume data were available. While CY 2018 serves as the base year, the forecast incorporates actual CY 2019 activity to most accurately represent the current state of activity at the Airport. Published airline schedules for CY 2018 provide the basis for discussions regarding the airlines serving the Airport, the destinations served from the Airport, and the average aircraft seat capacity. Published schedule data through March 2020 were used to validate assumptions and to inform the development of future activity forecasts.

An initial forecast scenario was developed considering a combination of national and local socioeconomic conditions. In response to local concerns regarding the impacts of growth in tourism on local infrastructure, a second scenario was developed considering specific local socioeconomic conditions and plans on the island of Kauai. The scenarios therefore represent a range of potential future activity and the latter was selected as the baseline forecast. Actual activity may vary due to unforeseen events or changes in airline service at the Airport.

3.1 HISTORICAL AVIATION ACTIVITY

The Federal Aviation Administration (FAA) classifies the Airport as a small-hub facility based on its percentage of nationwide passenger activity.[1] The Airport was ranked 75th in the United States in CY 2018; it accommodated approximately 1.7 million enplaned passengers in 2018 and approximately 130,000 aircraft operations, as shown in **Table 3-1**. Additionally, **Table 3-2** presents historical enplaned passenger data for LIH and other Hawaii airports from 2003 through 2018, and **Table 3-3** presents a comparison of historical enplaned passenger data for LIH to the historical enplaned passengers for all US airports.

- **CY 2003 – CY 2007.** Between 2003 and 2007, enplaned passengers increased at a compound annual growth rate (CAGR) of 4.3 percent, while total airport operations grew at a CAGR of 4.5 percent. Much of the passenger growth over this period occurred in 2007, when enplaned passengers increased 18.6 percent over 2006. Hawaiian Airlines accounted for 64 percent of the growth in enplaned passengers in 2007, with most of the increase coming as a result of improved load factor performance. Mesa (Go!) Airlines also accounted for a significant portion of the growth in enplaned passengers as a result of a 39 percent increase in seat capacity in 2007.

[1] As defined by the FAA, a small-hub primary airport enplanes between 0.05 percent and 0.25 percent of nationwide revenue enplaned passengers during a calendar year. Based on preliminary FAA data, the Airport enplaned approximately 1.6 million revenue passengers in CY 2018, slightly lower than the 1.7 million enplaned passengers recorded by the Airport.

TABLE 3-1 HISTORICAL ENPLANED PASSENGERS AND AIRCRAFT OPERATIONS BY YEAR

YEAR	ENPLANED PASSENGERS	PASSENGERS YEAR-OVER-YEAR PERCENTAGE CHANGE	OPERATIONS	OPERATIONS YEAR-OVER-YEAR PERCENTAGE CHANGE
2003	1,244,804		97,576	
2004	1,262,762	1.4%	104,506	7.1%
2005	1,278,694	1.3%	107,497	2.9%
2006	1,241,455	-2.9%	118,169	9.9%
2007	1,472,376	18.6%	116,461	-1.4%
2008	1,308,564	-11.1%	113,371	-2.7%
2009	1,242,592	-5.0%	99,171	-12.5%
2010	1,207,090	-2.9%	106,815	7.7%
2011	1,235,523	2.4%	113,344	6.1%
2012	1,328,191	7.5%	118,431	4.5%
2013	1,357,563	2.2%	126,302	6.6%
2014	1,360,742	0.2%	126,577	0.2%
2015	1,409,064	3.6%	132,398	4.6%
2016	1,477,685	4.9%	129,503	-2.2%
2017	1,581,098	7.0%	130,084	0.4%
2018	1,702,290	7.7%	130,278	0.1%
Compound Annual Growth Rate				
2008 – 2013	0.7%		2.2%	
2013 – 2018	4.6%		0.6%	
2008 – 2018	2.7%		1.4%	

NOTE: Due to limited detailed data, 2003 and 2004 enplaned passengers estimated based on total passenger data.
SOURCE: State of Hawaii, Department of Transportation – Airports Division, August 2019.

TABLE 3-2 HISTORICAL ENPLANED PASSENGERS COMPARISON – LIHUE AND OTHER AIRPORTS

YEAR	LIHUE	LIHUE SHARE	OTHER HAWAII AIRPORTS	OTHER HAWAII AIRPORTS SHARE	TOTAL	HAWAII ANNUAL GROWTH RATE
2003	1,244,804	8.1%	14,173,575	91.9%	15,418,379	-
2004	1,262,762	7.5%	15,669,458	92.5%	16,932,220	9.8%
2005	1,278,694	7.6%	15,453,267	92.4%	16,731,961	-1.2%
2006	1,241,455	7.4%	15,558,198	92.6%	16,799,653	0.4%
2007	1,472,376	8.1%	16,745,763	91.9%	18,218,139	8.4%
2008	1,308,564	8.3%	14,490,099	91.7%	15,798,663	-13.3%
2009	1,242,592	8.2%	13,918,140	91.8%	15,160,732	-4.0%
2010	1,207,090	7.9%	14,037,154	92.1%	15,244,244	0.6%
2011	1,235,523	8.2%	13,897,955	91.8%	15,133,478	-0.7%
2012	1,328,191	8.2%	14,898,987	91.8%	16,227,178	7.2%
2013	1,357,563	8.2%	15,289,157	91.8%	16,646,720	2.6%
2014	1,360,742	8.2%	15,308,407	91.8%	16,669,149	0.1%
2015	1,409,064	8.2%	15,801,250	91.8%	17,210,314	3.2%
2016	1,477,685	8.3%	16,223,195	91.7%	17,700,880	2.9%
2017	1,581,098	8.5%	16,988,298	91.5%	18,569,396	4.9%
2018	1,702,290	9.1%	17,101,543	90.9%	18,803,833	1.3%
Compound Annual Growth Rate						
2008 – 2013	0.7%		1.1%		1.1%	
2013 – 2018	4.6%		2.3%		2.5%	
2008 – 2018	2.7%		1.7%		1.8%	

NOTE: Due to limited detailed data, 2003 and 2004 enplaned passengers estimated based on total passenger data.
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019; Federal Aviation Administration, Terminal Area Forecast, February 2019.

TABLE 3-3 ENPLANED PASSENGERS COMPARISON – LIHUE AIRPORT AND UNITED STATES

YEAR	ENPLANED PASSENGERS	ANNUAL GROWTH RATE	US TOTAL ENPLANED PASSENGERS	ANNUAL GROWTH RATE	LIH MARKET SHARE OF US TOTAL
2003	1,244,804	-	643,224,641	-	0.19%
2004	1,262,762	1.4%	690,967,734	7.4%	0.18%
2005	1,278,694	1.3%	733,403,888	6.1%	0.17%
2006	1,241,455	-2.9%	732,886,054	-0.1%	0.17%
2007	1,472,376	18.6%	756,525,464	3.2%	0.19%
2008	1,308,564	-11.1%	747,466,798	-1.2%	0.18%
2009	1,242,592	-5.0%	695,488,533	-7.0%	0.18%
2010	1,207,090	-2.9%	702,818,621	1.1%	0.17%
2011	1,235,523	2.4%	722,926,202	2.9%	0.17%
2012	1,328,191	7.5%	731,053,513	1.1%	0.18%
2013	1,357,563	2.2%	734,336,521	0.4%	0.18%
2014	1,360,742	0.2%	753,529,877	2.6%	0.18%
2015	1,409,064	3.6%	786,384,586	4.4%	0.18%
2016	1,477,685	4.9%	822,586,152	4.6%	0.18%
2017	1,581,098	7.0%	846,556,739	2.9%	0.19%
2018	1,702,290	7.7%	887,027,038	4.8%	0.19%
Compound Annual Growth Rate					
2008 – 2013	0.7%		-0.4%		
2013 – 2018	4.6%		3.9%		
2008 – 2018	2.7%		1.7%		

NOTE: US total enplaned passenger numbers may differ as Federal Aviation Administration Terminal Area Forecast data is routinely updated
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019; Federal Aviation Administration, Terminal Area Forecast, February 2019.

- **CY 2008 and CY 2009**. The Great Recession had a noticeable impact on passenger demand and scheduled airline operations between 2008 and 2009. Overall enplaned passenger demand to Hawaii declined 9.1 percent in 2008, and it declined an additional 11.1 percent in 2009. Comparatively, LIH enplaned passengers declined 11.1 percent in 2008 and an additional 5.0 percent in 2009. As a result of lower passenger demand caused by the economic downturn, scheduled airline seat capacity was reduced by 11.3 percent in CY 2008 and 5.3 percent in CY 2009. Specifically contributing to these seat capacity reductions were the following airline capacity changes:
  - Aloha Airlines ceased operations in March 2008, reducing seat capacity by almost 650,000 seats in 2008 and 2009.
  - ATA Airlines also ceased operations in 2008, leading to a reduction in almost 16,000 seats.
  - The operating certificates of America West Airlines and US Airways were merged in September 2007, and the combined entity temporarily reduced seat capacity in 2008 before returning to growth mode in 2009.
  - Hawaiian Airlines offset some of the declines in 2008 and 2009 by adding 18 percent seat capacity in 2008 and 5 percent in 2009, resulting in 182,000 seats added to the Airport over the 2-year period.
- **CY 2010 – CY 2013**. With the economy recovering, enplaned passengers increased from 1.2 million in CY 2010 to almost 1.4 million in CY 2013, a CAGR of 4.0 percent. In CY 2010, enplaned passengers decreased 2.9 percent, but then increased by 2.4 percent in CY 2011. The largest reduction in service in 2010 was service to Daniel K. Inouye International Airport (HNL) with a 16.4 percent reduction in seat capacity. Hawaiian Airlines and Mokulele Flight Services (via Republic Airlines partnership) both reduced seat capacity to HNL in 2010 by more than 90,000 seats each. Seat capacity to HNL continued to decline in 2011, but the decline was offset by additional seat capacity in other markets, as well as the addition of service to Oakland, California (OAK), and San Jose, California (SJC), by Alaska Airlines. Alaska Airlines increased its seat capacity by 77.7 percent in 2011. Enplaned passengers continued to grow in 2012 by 7.5 percent and in 2013 by 2.2 percent. During this period, Alaska

Airlines continued to grow seat capacity to OAK and SJC, and it also started service to Portland, Oregon (PDX) in 2012 and San Diego, California (SAN) in 2013. Additionally, WestJet continued to grow air service to Vancouver, Canada (YVR), in 2012 by doubling its seat capacity. Hawaiian Airlines and Mesa (Go!) Airlines respectively grew their seat capacity by 11.8 percent and 28.6 percent in 2012. In 2013 most of the enplaned passenger growth was accommodated by improved load factors as scheduled airline seat capacity was down year-over-year by 2.9 percent.

- **CY 2014 – CY 2016**. Enplaned passengers remained relatively flat in 2014 on a seat capacity increase of 7.4 percent. In April 2014 Mesa (Go!) Airlines ceased operations, while several airlines added significant capacity. WestJet increased seat capacity by 71.0 percent to YVR, and Hawaii Island Air more than doubled seat capacity to HNL. Additionally, Hawaiian Airlines and Alaska Airlines increased seat capacity by 11.1 and 8.5 percent, respectively. As a result of stagnant passenger growth in 2014, airlines serving LIH reduced seat capacity by 1.4 percent in 2015. Enplaned passengers once again started to increase in 2015, resulting in a 3.6 percent increase year-over-year. Virtually all airlines experienced an increase in enplaned passengers in 2015. The integration of the American Airlines and US Airways brands was completed in October 2015, resulting in American Airlines assuming all US Airways operations.
- **CY 2017 – CY 2018**. Between CY 2016 and CY 2018, the increase in enplaned passengers at the Airport was 7.3 percent, while US enplaned passenger growth was 4.5 percent. The CY 2017 growth rate of 7.0 percent in enplaned passengers was accommodated by an 8.7 percent increase in seat capacity. American Airlines added service to Dallas–Fort Worth, Texas (DFW), in 2017, resulting in an 18.3 percent increase in seat capacity for American Airlines. Hawaiian Airlines added 34 percent more seat capacity to Los Angeles, California (LAX) and 12 percent more seat capacity to OAK. Enplaned passengers continued to grow in 2018 by 7.7 percent, despite the cessation of service by Hawaii Island Air in November 2017. All other airlines serving LIH in 2018 experienced either flat or increased enplaned passengers year-over-year. United Airlines, Hawaiian Airlines, and Delta Air Lines were the largest benefactors of the increased enplaned passenger activity at the Airport, increasing by 87,462, 54,232, and 37,424 enplaned passengers, respectively. It is also important to note the 7.7 percent increase in enplaned passengers in CY 2018 occurred amid the historic.

3.1.1 AIRLINE SERVICE

As of December 2018, seven airlines provide scheduled passenger operations at the Airport: Air Canada, Alaska Airlines, American Airlines, Delta Air Lines, Hawaiian Airlines, United Airlines, and WestJet. All of these airlines, apart from Air Canada, have continually operated at the Airport since 2009. Airline consolidation and the changing competitive dynamics due to airline bankruptcies have changed the profile of carriers serving the Airport. **Table 3-4** presents the scheduled passenger airlines serving the Airport since CY 2008.

Table 3-5 summarizes the number of daily nonstop departures by market at the Airport in 2018. Hawaiian Airlines provided nonstop service to five markets with an average 25.4 daily departures, including all major Hawaiian interisland airports (HNL, Kahului [OGG], and Kona [KOA]), OAK, and LAX. Alaska Airlines also provided service to five destinations on the West Coast of the United States, with an average 4.3 daily departures. American Airlines, Delta Air Lines, and United Airlines provided service to three, two, and three airports, respectively, with all three airlines providing nonstop service to LAX. In CY 2018, both WestJet and Air Canada provided service to YVR; however, Air Canada has since canceled service citing the Boeing 737 MAX aircraft grounding as the primary reason for canceling the service[2].

[2] It is uncertain the Air Canada service to Lihue will be restored once the Boeing 737 MAX is returned to service.

TABLE 3-4 PASSENGER AIRLINES SERVING THE AIRPORT BY YEAR

AIRLINE	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Air Canada											●
Alaska Airlines	●	●	●	●	●	●	●	●	●	●	●
American Airlines	●	●	●	●	●	●	●	●	●	●	●
Delta Air Lines	●	●	●	●	●	●	●	●	●	●	●
Hawaiian Airlines	●	●	●	●	●	●	●	●	●	●	●
United Airlines	●	●	●	●	●	●	●	●	●	●	●
WestJet		●	●	●	●	●	●	●	●	●	●
Airlines No Longer Serving the Airport											
Aloha Airlines	●										
ATA Airlines	●										
Hawaii Island Air	●	●	●	●	●	●	●	●	●	●	
Mesa Airlines	●	●	●	●	●	●	●				
US Airways	●	●	●	●	●	●	●	●			

SOURCE: State of Hawaii, Department of Transportation – Airports Division, September 2019 (2008 to 2018 data).

TABLE 3-5 AVERAGE DAILY NONSTOP DEPARTURES BY MARKET IN CALENDAR YEAR 2018

	AVERAGE DAILY DEPARTURES							
MARKET	AIR CANADA	ALASKA AIRLINES	AMERICAN AIRLINES	DELTA AIR LINES	HAWAIIAN AIRLINES	UNITED AIRLINES	WESTJET	AIRPORT TOTAL
Denver						1.0		1.0
Dallas			0.1					0.1
Honolulu					18.7			18.7
Kona					1.3			1.3
Los Angeles			2.0	0.9	1.0	1.6		5.5
Kahului					3.9			3.9
Oakland		0.5			0.5			0.9
Phoenix			1.0					1.0
Portland		0.5						0.5
San Diego		0.7						0.7
San Francisco						1.9		1.9
San Jose, CA		0.8						0.8
Seattle		1.9		0.8				2.7
Vancouver	0.0						0.5	0.5
Total	**0.0**	**4.3**	**3.1**	**1.7**	**25.4**	**4.5**	**0.5**	**39.5**

NOTE: Table columns and rows may not add up to Airport and Airline totals due to rounding.
SOURCE: Innovata, September 2019.

An important Airport characteristic is the distribution of its origin and destination (O&D) markets, which is a function of air travel demand, as well as available services and facilities. **Table 3-6** presents historical data on the Airport's primary (i.e., top 20) O&D markets in CY 2018. The airlines primarily serve short- and long-haul destinations from the Airport due to the geometry of the Airport. Additionally, international service is limited by the length of the Airport's runway at 6,500 feet. Approximately 1.3 million, or 82.0 percent, of the O&D passengers in CY 2018 traveled between the Airport and the top 20 O&D markets, as shown in Table 3-6. In CY 2018, approximately two-thirds of all the top 20 O&D markets had nonstop service from the Airport, with the top unserved O&D markets being Salt Lake City, Utah (SLC), Sacramento, California (SMF), and Las Vegas, Nevada (LAS), respectively.

TABLE 3-6 TOP 20 ORIGIN AND DESTINATION MARKETS IN CALENDAR YEAR 2018

RANK	MARKETS	LENGTH OF HAUL	TOTAL O&D PASSENGERS	AVERAGE FARE (DOLLARS)	SCHEDULED NONSTOP SERVICE AT LIH[2]
1	Honolulu	SH	436,468	67	●
2	Los Angeles	LH	169,775	271	●
3	Maui	SH	87,061	94	●
4	Seattle	LH	82,160	240	●
5	Oakland	LH	58,393	256	●
6	San Diego	LH	54,199	233	●
7	San Jose, CA	LH	49,690	250	●
8	San Francisco	LH	45,776	304	●
9	Kona	SH	40,238	98	●
10	Portland	SH	38,453	259	●
11	Salt Lake City	LH	36,105	260	
12	Denver	LH	33,012	349	●
13	Phoenix	LH	31,415	324	●
14	Sacramento	LH	21,668	287	
15	Las Vegas	LH	19,813	293	
16	Hilo	SH	19,779	95	
17	Chicago-ORD	LH	17,783	431	
18	Minneapolis	LH	15,237	412	
19	Dallas-DFW	LH	12,541	440	●
20	New York-JFK	LH	11,601	454	
	Total Top 20 Airports		1,281,167		
	Other O&D Markets		280,718		
	Total O&D Passengers		1,561,885	230	

NOTES: O&D – Origin and Destination

1 Short Haul (SH) = 0 to 600 miles; Medium Haul (MH) = 601 to 1,800 miles; Long Haul (LH) = Over 1,800 miles

2 As of December 2018.

SOURCES: Diio Market Intelligence, September 2019; US Department of Transportation, Origin and Destination Survey, 2018; Innovata, September 2019 (2018 schedule data).

3.1.2 PASSENGER AIRLINE ACTIVITY

As shown in **Table 3-7**, the Airport primarily serves O&D passengers (i.e., local passengers who begin or end their trips at the Airport); although, the number of connecting passengers has increased in recent years. In 2018, 96.4 percent of passengers at the Airport were classified as O&D, based on the US Department of Transportation (US DOT) Origin and Destination Survey. This represents a decrease from 96.8 percent in 2017. Both originating passengers and connecting passengers have grown steadily over the past 10 years. Connecting passengers are growing as a result of increased nonstop service to mainland US markets from the Airport. Airline schedules now provide improved connectivity primarily to and from HNL via the Airport. Connecting passengers at the Airport have grown at a CAGR of 10.3 percent since 2008, while originating passengers have grown at a CAGR of 2.5 percent over the same period. It is important to note the 3.6 percent connecting passengers in CY 2018 at LIH is significantly below HNL, where the Hawaiian Airlines network model is designed for connecting a larger percentage of passengers.

Table 3-8 presents historical enplaned passenger activity by airline and the corresponding share of total enplaned passengers from 2014 through 2018. Over the past 5 years, Hawaiian Airlines has maintained more than 50 percent share of enplaned passengers at the Airport, stabilizing over the past 4 years between 57.4 and 58.4 percent. United Airlines and Alaska Airlines also had double-digit shares of the Airport's enplaned passengers in CY 2018, followed by American Airlines at just under 10.0 percent share.

TABLE 3-7 HISTORICAL ORIGINATING AND CONNECTING ENPLANED PASSENGERS

YEAR	O&D PASSENGER SHARE OF ENPLANED PASSENGERS	CONNECTING PASSENGER SHARE OF ENPLANED PASSENGERS	ENPLANED PASSENGERS
2003	97.6%	2.4%	1,244,804
2004	97.9%	2.1%	1,262,762
2005	98.0%	2.0%	1,278,694
2006	98.6%	1.4%	1,241,455
2007	98.5%	1.5%	1,472,376
2008	98.2%	1.8%	1,308,564
2009	98.4%	1.6%	1,242,592
2010	98.0%	2.0%	1,207,090
2011	97.9%	2.1%	1,235,523
2012	97.7%	2.3%	1,328,191
2013	97.7%	2.3%	1,357,563
2014	97.8%	2.2%	1,360,742
2015	97.8%	2.2%	1,409,064
2016	97.7%	2.3%	1,477,685
2017	96.8%	3.2%	1,581,098
2018	96.4%	3.6%	1,702,290
Compound Annual Growth Rate			
2008 – 2013	0.6%	5.8%	0.7%
2013 – 2018	4.3%	14.9%	4.6%
2008 – 2018	2.5%	10.3%	2.7%

NOTE: O&D and connecting passenger totals calculated using US Department of Transportation, Origin and Destination Survey data
SOURCES: Diio Market Intelligence, September 2019; US Department of Transportation, Origin and Destination Survey, September 2019 (O&D and connecting passenger shares); State of Hawaii, Department of Transportation – Airports Division, August 2019 (enplaned passengers).

TABLE 3-8 HISTORICAL ENPLANED PASSENGERS BY AIRLINE OR CARRIER GROUP

	2014		2015		2016		2017		2018	
AIRLINE	ENPLANED PASSENGERS	SHARE	ENPLANED PASSENGERS	SHARE	ENPLANED PASSENGERS	SHARE	ENPLANED PASSENGERS	SHARE	ENPLANED PASSENGERS	SHARE
Air Canada	-	-	-	-	-	-	-	-	467	0.0%
Alaska Airlines	173,861	12.8%	189,411	13.4%	190,911	12.9%	187,368	11.9%	206,434	12.1%
American Airlines	86,645	6.4%	94,636	6.7%	142,256	9.6%	162,529	10.3%	162,416	9.5%
Delta Air Lines	57,615	4.2%	62,208	4.4%	64,783	4.4%	70,465	4.5%	107,889	6.3%
Hawaii Island Air	74,561	5.5%	33,451	2.4%	71,935	4.9%	78,673	5.0%	-	-
Hawaiian Airlines	730,188	53.7%	822,764	58.4%	854,097	57.8%	922,750	58.4%	976,982	57.4%
Mesa Airlines	9,831	0.7%	-	-	-	-	-	-	-	-
Mokulele Flight Service	-	-	-	-	-	-	15	0.0%	28	0.0%
Trans Air	213	0.0%	82	0.0%	54	0.0%	47	0.0%	108	0.0%
US Airways	55,277	4.1%	47,540	3.4%	-	-	-	-	-	-
United Airlines	149,517	11.0%	135,690	9.6%	132,209	8.9%	136,749	8.6%	224,211	13.2%
WestJet	23,034	1.7%	23,282	1.7%	21,440	1.5%	22,502	1.4%	23,755	1.4%
Total Enplaned Passengers	1,360,742		1,409,064		1,477,685		1,581,098		1,702,290	

NOTE: Table columns and rows may not add up to Airport and Airline totals due to rounding.
SOURCE: State of Hawaii, Department of Transportation – Airports Division, August 2019.

3.1.3 AIRCRAFT OPERATIONS

Table 3-9 presents the Airport's historical operations by air service category between 2003 and 2018. Total aircraft activity at the Airport peaked at 130,278 aircraft operations in CY 2018. Total aircraft operations increased from 113,371 in CY 2008 to 130,278 in CY 2018, a CAGR of 1.4 percent. **Table 3-10**, **Table 3-11**, and **Table 3-12** show passenger airline, general aviation (GA), and military operations at the Airport individually, along with their corresponding share of total Airport operations.

- **Air Carrier** – commercial aircraft takeoffs and landings with aircraft greater than 60 seats. Since CY 2013, passenger air carrier operations have increased from 26,194 to 27,412 in CY 2018, reflecting a CAGR of 0.9 percent. However, in 2012 passenger air carrier operations reached 28,522 operations, an all-time high for the Airport. Even with increases in passenger operations, to accommodate demand, operations have been conducted with larger aircraft and higher load factors. From CY 2013 to CY 2018, enplaned passengers increased at a CAGR of 4.6 percent, compared to 0.9 percent for passenger air carrier operations. Air carrier operations in CY 2018 represented 21.0 percent of total Airport operations.
- **Air Taxi** – defined as commercial aircraft takeoffs and landings with aircraft less than or equal to 60 seats. Since CY 2008, air taxi operations increased from 57,303 to a record high of 78,858 operations in CY 2018. Over this period, air taxi operations increased steadily at a CAGR of 3.2 percent, and more recently between CY 2013 and CY 2018 air taxi operations have grown at a CAGR of 2.7 percent. Air taxi operations reached a high of 76.7 percent of total passenger airline operations in 2015, and they consistently represented more than 70.0 percent of total passenger airline operations since 2013. Additionally, air taxi operations in CY 2018 represented 60.5 percent of total Airport operations.
- **General Aviation** – defined as all civil aircraft takeoffs and landings not classified as commercial. Since CY 2008, GA operations declined at a CAGR of 3.0 percent from 29,681 to 21,790 in CY 2018. Over this period, GA activity reached a high of 33,207 operations in CY 2010. For CY 2018, GA operations represented 16.7 percent of total Airport operations, down from a high of 31.1 percent of total Airport operations in CY 2010.
- **Military** – takeoffs and landings by military aircraft. Military operations declined at a CAGR of 7.8 percent from 5,023 in CY 2008 to 2,218 in CY 2018. Over this period, military activity reached a high of 6,490 operations in CY 2009. Since 2013, military operations have declined at a CAGR of 18.9 percent. Furthermore, military operations share of total Airport operations declined from a high of 6.5 percent in CY 2009 to a low of 1.7 percent in CY 2018.

TABLE 3-9 HISTORICAL AIRCRAFT OPERATIONS

YEAR	AIR CARRIER	AIR TAXI	GENERAL AVIATION	MILITARY	TOTAL
2003	23,833	48,767	19,961	5,015	97,576
2004	24,961	50,538	24,008	4,999	104,506
2005	27,220	54,987	19,639	5,651	107,497
2006	26,551	61,438	26,287	3,893	118,169
2007	25,652	55,705	30,342	4,762	116,461
2008	21,364	57,303	29,681	5,023	113,371
2009	21,015	51,207	20,459	6,490	99,171
2010	22,779	46,619	33,207	4,210	106,815
2011	25,517	55,732	26,503	5,592	113,344
2012	28,522	62,482	23,746	3,681	118,431
2013	26,194	68,938	24,857	6,313	126,302
2014	25,849	65,151	29,771	5,806	126,577
2015	23,598	77,497	24,659	6,644	132,398
2016	25,789	76,263	22,956	4,495	129,503
2017	28,363	78,236	20,747	2,738	130,084
2018	27,412	78,858	21,790	2,218	130,278
Compound Annual Growth Rate					
2008 – 2013	4.2%	3.8%	-3.5%	4.7%	2.2%
2013 – 2018	0.9%	2.7%	-2.6%	-18.9%	0.6%
2008 – 2018	2.5%	3.2%	-3.0%	-7.8%	1.4%

SOURCE: State of Hawaii, Department of Transportation – Airports Division, September 2019.

TABLE 3-10 HISTORICAL AIR CARRIER AND AIR TAXI OPERATIONS

YEAR	AIR CARRIER OPERATIONS	AIR TAXI OPERATIONS	AIR CARRIER SHARE OF PASSENGER AIRLINE OPERATIONS	AIR TAXI SHARE OF PASSENGER AIRLINE OPERATIONS	TOTAL AIRPORT OPERATIONS	AIR CARRIER SHARE OF TOTAL AIRPORT OPERATIONS	AIR TAXI SHARE OF TOTAL AIRPORT OPERATIONS	PASSENGER AIRLINE OPERATIONS SHARE OF TOTAL OPERATIONS
2003	23,833	48,767	32.8%	67.2%	97,576	24.4%	50.0%	74.4%
2004	24,961	50,538	33.1%	66.9%	104,506	23.9%	48.4%	72.2%
2005	27,220	54,987	33.1%	66.9%	107,497	25.3%	51.2%	76.5%
2006	26,551	61,438	30.2%	69.8%	118,169	22.5%	52.0%	74.5%
2007	25,652	55,705	31.5%	68.5%	116,461	22.0%	47.8%	69.9%
2008	21,364	57,303	27.2%	72.8%	113,371	18.8%	50.5%	69.4%
2009	21,015	51,207	29.1%	70.9%	99,171	21.2%	51.6%	72.8%
2010	22,779	46,619	32.8%	67.2%	106,815	21.3%	43.6%	65.0%
2011	25,517	55,732	31.4%	68.6%	113,344	22.5%	49.2%	71.7%
2012	28,522	62,482	31.3%	68.7%	118,431	24.1%	52.8%	76.8%
2013	26,194	68,938	27.5%	72.5%	126,302	20.7%	54.6%	75.3%
2014	25,849	65,151	28.4%	71.6%	126,577	20.4%	51.5%	71.9%
2015	23,598	77,497	23.3%	76.7%	132,398	17.8%	58.5%	76.4%
2016	25,789	76,263	25.3%	74.7%	129,503	19.9%	58.9%	78.8%
2017	28,363	78,236	26.6%	73.4%	130,084	21.8%	60.1%	81.9%
2018	27,412	78,858	25.8%	74.2%	130,278	21.0%	60.5%	81.6%
Compound Annual Growth Rate								
2008 – 2013	4.2%	3.8%	---	---	2.2%	---	---	---
2013 – 2018	0.9%	2.7%	---	---	0.6%	---	---	---
2008 – 2018	2.5%	3.2%	---	---	1.4%	---	---	---

NOTE: Percentages may not add up to totals due to rounding.
SOURCE: State of Hawaii, Department of Transportation – Airports Division, September 2019.

TABLE 3-11 HISTORICAL GENERAL AVIATION AIRCRAFT OPERATIONS

YEAR	GENERAL AVIATION	SHARE OF AIRPORT TOTAL	TOTAL AIRPORT OPERATIONS
2003	19,961	20.5%	97,576
2004	24,008	23.0%	104,506
2005	19,639	18.3%	107,497
2006	26,287	22.2%	118,169
2007	30,342	26.1%	116,461
2008	29,681	26.2%	113,371
2009	20,459	20.6%	99,171
2010	33,207	31.1%	106,815
2011	26,503	23.4%	113,344
2012	23,746	20.1%	118,431
2013	24,857	19.7%	126,302
2014	29,771	23.5%	126,577
2015	24,659	18.6%	132,398
2016	22,956	17.7%	129,503
2017	20,747	15.9%	130,084
2018	21,790	16.7%	130,278
Compound Annual Growth Rate			
2008 – 2013	-3.5%		2.2%
2013 – 2018	-2.6%		0.6%
2008 – 2018	-3.0%		1.4%

SOURCE: State of Hawaii, Department of Transportation – Airports Division, September 2019.

TABLE 3-12 HISTORICAL MILITARY AIRCRAFT OPERATIONS

YEAR	MILITARY	SHARE OF AIRPORT TOTAL	TOTAL AIRPORT OPERATIONS
2003	5,015	5.1%	97,576
2004	4,999	4.8%	104,506
2005	5,651	5.3%	107,497
2006	3,893	3.3%	118,169
2007	4,762	4.1%	116,461
2008	5,023	4.4%	113,371
2009	6,490	6.5%	99,171
2010	4,210	3.9%	106,815
2011	5,592	4.9%	113,344
2012	3,681	3.1%	118,431
2013	6,313	5.0%	126,302
2014	5,806	4.6%	126,577
2015	6,644	5.0%	132,398
2016	4,495	3.5%	129,503
2017	2,738	2.1%	130,084
2018	2,218	1.7%	130,278
Compound Annual Growth Rate			
2008 – 2013	4.7%		2.2%
2013 – 2018	-18.9%		0.6%
2008 – 2018	-7.8%		1.4%

SOURCE: State of Hawaii, Department of Transportation – Airports Division, September 2019.

Table 3-13 presents the historical based aircraft at the Airport. For the federal FY 2018, single-engine aircraft and helicopters comprised 41 of the total 46, or 89.1 percent of the total, based aircraft at the Airport. Helicopters reached a 15-year high of 22 based aircraft in CY 2017 and CY 2018. Multi-engine aircraft also reached a 15-year high of 5 based aircraft in CY 2017 and CY 2018. Single-engine aircraft reached a 15-year high of 22 based aircraft in CY 2012 and CY 2013; however, that number declined to 19 based aircraft in CY 2018.

TABLE 3-13 HISTORICAL BASED AIRCRAFT

YEAR	SINGLE-ENGINE	JET	MULTI-ENGINE	HELICOPTER	OTHER	TOTAL
2003	8	0	2	17	0	27
2004	12	0	2	14	0	28
2005	12	0	2	14	0	28
2006	12	0	2	14	0	28
2007	12	0	2	14	0	28
2008	12	0	2	14	0	28
2009	12	0	2	14	0	28
2010	12	0	2	14	0	28
2011	12	0	2	14	0	28
2012	22	0	2	18	2	44
2013	22	0	2	18	2	44
2014	20	0	4	17	2	43
2015	20	0	4	17	0	41
2016	20	0	4	17	2	43
2017	19	0	5	22	0	46
2018	19	0	5	22	0	46
Compound Annual Growth Rate						
2008 – 2013	12.9%	-	0.0%	5.2%	-	9.5%
2013 – 2018	-2.9%	-	20.1%	4.1%	-100.0%	0.9%
2008 – 2018	4.7%	-	9.6%	4.6%	-	5.1%

SOURCE: Federal Aviation Administration, Terminal Area Forecast, February 2019.

Table 3-14 compares growth rates for enplaned passengers, aircraft operations, and based aircraft at the Airport with national growth rates from 2008 through 2018. Except for GA activity, the Airport growth rates were higher than those for the United States. Increases in enplaned passengers at the Airport averaged a CAGR of 2.7 percent, exceeding the CAGR of 2.1 percent for the United States. Based aircraft at the Airport increased 5.1 percent annually, whereas based aircraft in the United States decreased an average of 0.4 percent annually. Additionally, GA operations declined 3.0 percent annually, versus a decline of 1.3 percent annually in the United States.

TABLE 3-14 AIRPORT COMPARISON TO UNITED STATES TRENDS

CATEGORY	COMPOUND ANNUAL GROWTH RATE (2008 - 2018)	
	LIHUE	UNITED STATES
Enplaned Passengers	2.7%	2.1%
Air Carrier and Air Taxi Aircraft Operations	3.1%	-0.9%
General Aviation Aircraft Operations	-3.0%	-1.3%
Total Aircraft Operations	1.4%	-1.1%
Based Aircraft	5.1%	-0.4%

SOURCES: State of Hawaii, Department of Transportation – Airports Division, September 2019; Federal Aviation Administration, Terminal Area Forecast, February 2019.

3.2 FACTORS AFFECTING AVIATION AT THE AIRPORT

This section discusses factors that could influence future aviation demand at the Airport. While not all the data and information related to these factors have directly been incorporated into the forecasts of Airport activity discussed in Section 3.3, these factors were indirectly considered and analyzed in developing the forecasts.

3.2.1 DEMOGRAPHICS

To a large degree, demand for air travel is dependent on the demographic and economic characteristics of the geographical area served by an airport. However, with tourism driving much of the economic activity in Hawaii, and on the Island of Kauai, this dependence is particularly significant for O&D passengers from the US mainland, predominantly from the West Coast of the United States. Nonetheless, local demographics and infrastructure growth will play an important role in supporting tourism activities and thus demand for air travel to Kauai.

3.2.2 ECONOMIC ACTIVITY

In addition to airline cost factors, the overall state of the economy affects the propensity to travel and, therefore, airline revenue. Because economic conditions are typically cyclical over time (over longer periods, average changes are more regular and predictable), trends can be extracted from the balance of strong and weak economic years. However, when combined with the uneven growth in the industry and at the Airport over the past 15 years (the annual growth rate in numbers of passengers at LIH has varied from -11.1 percent to 18.6 percent over the past 15 years), changing economic conditions can affect the reliability of airline activity forecasts by further reducing the correlation between the economic conditions and the Airport's activity. Other factors, such as changes to aviation policies, have created large spikes in demand at the Airport and have thus impacted correlation analyses.

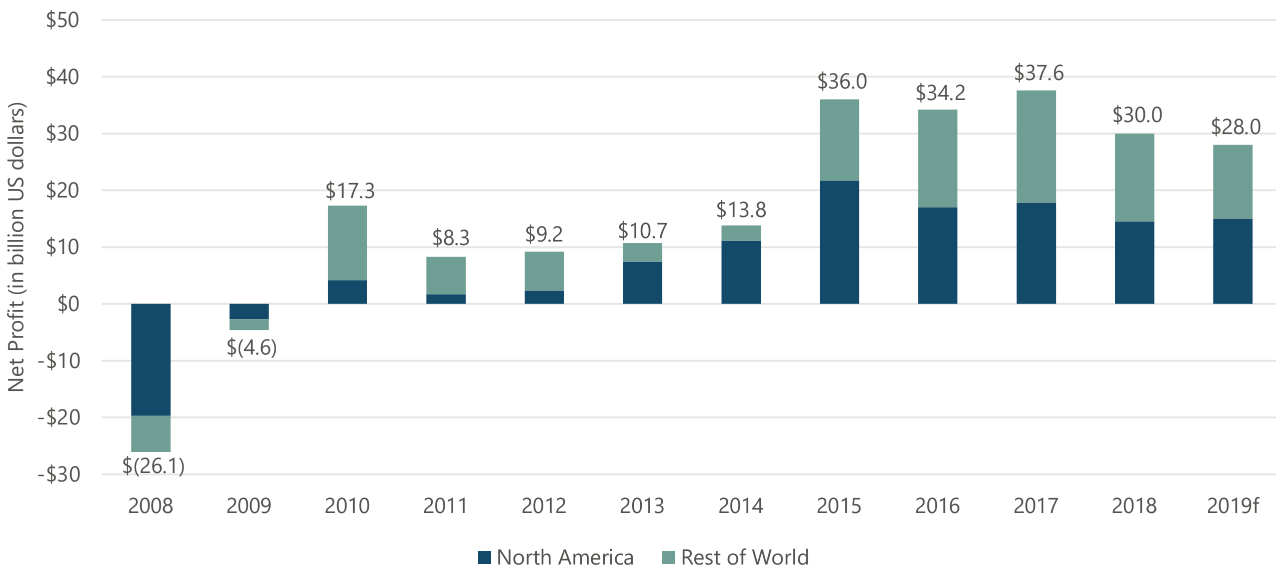
Historically, trends in airline travel have been closely correlated with national economic trends, most notably changes in gross domestic product (GDP). United States GDP is expected to increase 1.7 percent annually (CY 2018 to CY 2028), and the State of Hawaii's gross regional product (GRP) is expected to increase 1.8 percent annually through the forecast period. These factors indicate increasing demand for air service. Actual economic activity is likely to differ from these projections of economic growth, especially on a year-to-year basis, with demand for air service likely reacting in kind.

3.2.3 STATE OF THE AIRLINE INDUSTRY

In the aftermath of the terrorist attacks on September 11, 2001, the US airline industry experienced a material adverse shift in the demand for airline travel, which exacerbated problems for an airline industry already weakened by a slowing economy and rising labor and fuel costs. The result was 4 years of reported industry operating losses in 2001 through 2004, totaling more than $22 billion (excluding extraordinary charges and gains). Following these years, the airline industry recovered through 2007, with US airlines posting combined operating profits in all three years.[3] In 2008 and through the first half of 2009, the combination of record-high fuel prices, the Great Recession, and a weak dollar resulted in the worst financial environment for US airlines since the September 11 terrorist attacks. **Exhibit 3-1** shows airline profitability for North America and for the rest of the world from CY 2008 to forecast CY 2019.

[3] Airlines for America, *2009 Economic Report*, September 2019.

EXHIBIT 3-1 NET PROFIT OF COMMERCIAL AIRLINES WORLDWIDE (2008–2019)



SOURCES: International Air Transport Association, Airline Industry Economic Performance Data Tables, December 2015; International Air Transport Association, Airline Industry Economic Performance Data Tables, August 2019.

In 2008, many of the domestic network airlines announced significant capacity reductions, as well as increased fuel surcharges, airfares, and ancillary fees, and they instituted other measures to address the challenges associated with a weakened revenue environment. After a $4.6 billion loss in 2009, the global airline industry recovered and remained profitable, with annual net profits of $17.3 billion in 2010 and $8.3 billion in 2011. Globally, passenger traffic increased 6.3 percent from 2013 to 2014. After a $13.8 billion net profit for the global airline industry in 2014, the industry recorded $36.0 billion in profits in 2015. North American airline net profits reached $21.7 billion in 2015 compared with $11.1 billion in 2014. Lower fuel prices since 2014 have enabled greater capacity growth and have sustained profitability. North American airlines grew capacity 4.7 percent in 2016, 3.8 percent in 2017, an additional 4.9 percent in 2018, and an estimated 4.1 percent in 2019. North American airline net profit reached $17.8 billion in 2017 and $14.5 billion in 2018, and the International Air Transport Association projects it will grow to $15.0 billion in 2019.

3.2.4 MERGERS AND ACQUISITIONS

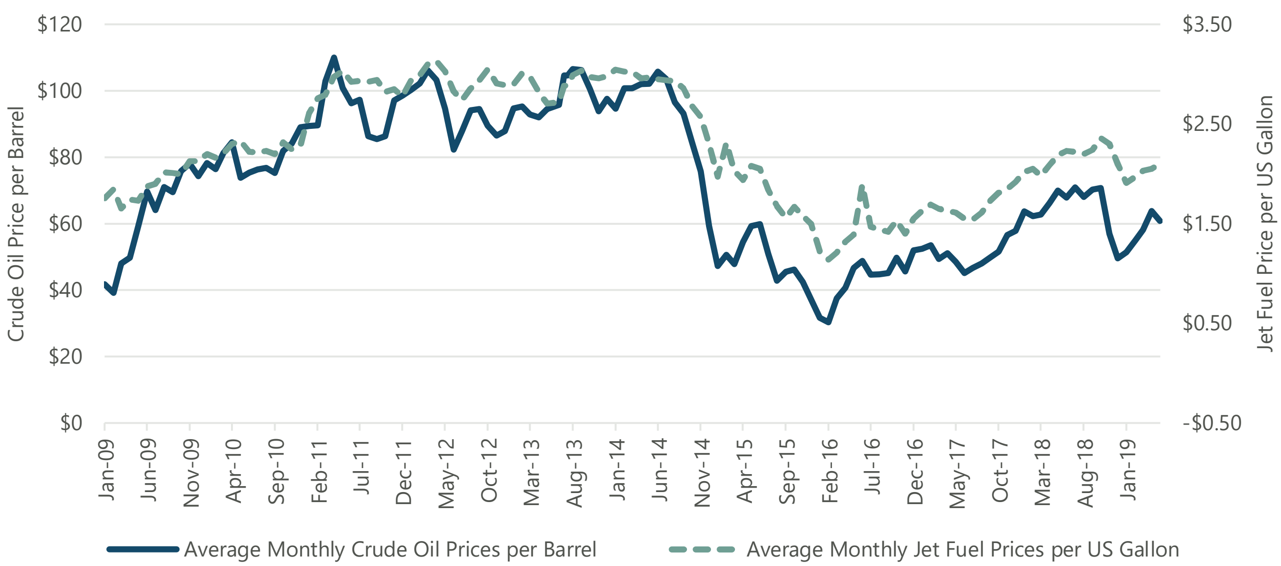
US airlines have merged or acquired competitors to achieve operational and commercial synergies and to improve their financial performance. A wave of consolidation began in 2005 when America West Airlines merged with US Airways, retaining the US Airways brand for the consolidated airline. In 2009, Delta Air Lines acquired Northwest Airlines. In 2010, United Airlines acquired Continental Airlines. In 2011, Southwest Airlines acquired AirTran Airways. In 2013, US Airways and American Airlines merged, with the consolidated airline retaining the American Airlines brand. The most recent consolidation occurred in 2016 when Alaska Airlines acquired Virgin America. The two airlines completed their operational integration in 2018. This consolidation across the industry has resulted in the realignment of some capacity as airlines integrate their networks and rationalize their deployment of aircraft and departing seats. Further consolidation of the US airline industry could affect the amount of capacity offered and could alter the competitive landscape.

3.2.5 COST OF AVIATION FUEL

The cost of aviation fuel is one of the largest and most volatile components of airline operating expenses. Historically, fuel has been the first or second largest operating expense for the airline industry, alternating with labor expense. According to the International Air Transport Association, fuel accounted for 23.5 percent of airline operating costs in 2018.

Exhibit 3-2 depicts monthly average jet fuel and crude oil prices from January 2009 through April 2019. The average price of jet fuel increased from $1.76 per gallon in January 2009 to maintain levels above $2.50 between January 2011 and November 2014, peaking at $3.13 in April 2012. Prices then declined, reaching a low of $1.14 per gallon in February 2016. From there, the average price of jet fuel grew to $2.27 per gallon in November 2018. The average price of jet fuel in April 2019 was $2.06 per gallon, well below the previously sustained high prices of 2011 through 2014. Fluctuating fuel costs will continue to affect airline profitability, and this could lead to changes in air service as airlines restructure air service to address increases or decreases in the cost of fuel.

EXHIBIT 3-2 HISTORICAL CRUDE OIL AND JET FUEL PRICES



SOURCE: Bureau of Transportation Statistics, US Energy Information Administration, August 2019.

3.2.6 THREAT OF TERRORISM AND GEOPOLITICAL ISSUES

Since September 11, 2001, the recurrence of terrorism incidents against either domestic or world aviation has remained a risk to achieving activity forecasts. Tighter security measures have restored the public's confidence in the integrity of the US and global aviation security systems. However, any terrorist incident targeting aviation could have an immediate and significant impact on the demand for air travel.

3.2.7 LOCAL AND NATIONAL POLICIES

As a result of recent weather events significantly impacting the ability of local infrastructure to meet local resident and tourism demand on natural resources, the various ways to manage future tourist volumes to Kauai have been evaluated. Any local policies that may be enacted to control the growth of accommodations or access for tourists to the island could have a direct impact on overall demand for air travel. While changes in policies are not anticipated through the end of the forecast period, any local or broader national policy changes can have a material impact on aviation demand.

3.2.8 CHANGES IN COMPETITIVE ENVIRONMENT

The Airport is subject to increased competition for domestic O&D passengers. This is especially true in the latter part of 2019 and through CY 2020 with the introduction of service by Southwest Airlines at the Airport. The long-awaited entry of Southwest Airlines to the Hawaii market has come to fruition with Southwest Airlines introducing direct service from the mainland United States and interisland service in CY 2019.

Southwest Airlines traditionally provided point-to-point service from strategic markets, operating at less congested, secondary airports in large metropolitan regions. By offering low fares and operating under a low-cost model that promotes efficient use of aircraft and minimizes overall operating costs (e.g., common aircraft fleet), the airline has successfully captured market share, and it is a strong competitor in the US airline industry.

The introduction of service by Southwest Airlines and other low-cost carriers and ultra-low-cost carriers in the past four decades has made airline travel generally more affordable and available to a wider number of people. In recent years, Southwest Airlines has focused development at a network of strategically located airports, including those in Baltimore (BWI), Chicago (MDW), Dallas (DAL), Denver (DEN), Houston (HOU), and Las Vegas (LAS). Southwest operates more centralized connecting route structures at these airports, accommodating many direct or connecting passengers, in addition to local passengers. As the airline's aircraft fleet has expanded into long-range Boeing 737-800 aircraft, and with the recent acquisition of the Boeing 737 MAX aircraft, the airline's ability to serve coast-to-coast and long-haul markets has expanded. With the strength of the Southwest Airlines network on the West Coast of the mainland United States, the strength of its loyalty program among West Coast travelers, and the enhanced range of its fleet, entry into the Hawaii market was inevitable.

Southwest Airlines has already announced service to LIH with direct service to the mainland United States via OAK and SJC and direct service to HNL. Southwest intends to offer four daily nonstop flights to and from HNL and alternating daily service between OAK and SJC to LIH for a total of five daily departures. Considering the size and seat density of the aircraft scheduled to serve the Airport, Southwest Airlines will likely become the second largest airline in terms of seat capacity and enplaned passengers serving the Airport in CY 2020. The considerable investment by Southwest Airlines will certainly increase the level of competition for interisland passengers for the foreseeable future.

Continued robust competition for passengers at the Airport between Southwest Airlines, Hawaiian Airlines, and the other airlines serving the Airport will most likely increase enplaned passengers as a result of a low fare environment to fill the new seat capacity. Additional changes in competition are not anticipated in the near future, yet entry of other competitors, particularly an ultra-low-cost airline, could further increase competition and thus enplaned passengers. Further international competition will be limited as a result of the aircraft range limitations due to the short runway length at the Airport.

3.2.9 IMPACT OF COVID-19 VIRUS OR OTHER PANDEMICS

The impact of pandemics on global aviation has remained a risk to achieving activity forecasts. While the aviation industry has proven its resilience during crises many times before, the current crisis caused by the COVID-19 outbreak, is unprecedented. The impact on aviation demand will be material in the short-term, and the long-term impact will be closely correlated to the duration of the global and regional restrictions impacting travel. Airline consolidation, bankruptcies, and dramatic cost reduction strategies are plausible scenarios should the duration of the pandemic be prolonged. Therefore, the recovery of aviation demand will be largely dependent on the duration of the pandemic and the economic support the industry receives from various government entities. However, the projected future aviation activity levels at the Airport serve as a guide for the implementation of future development projects. The aviation activity forecast is meant to provide future planning activity levels which are utilized as triggers for specific airport development projects. Should forecast activity levels not be achieved as anticipated in the forecast, those projects would be delayed as necessary until their respective activity level triggers are met.

3.3 ENPLANED PASSENGER FORECAST

Forecasts of aviation activity were developed considering historical activity, including passenger trends at the Airport and across the industry, historical trends and projections of local and national socioeconomic factors, and anticipated trends in the use of the Airport by Hawaiian Airlines, Southwest Airlines, and other airlines. The following subsections describe the methodologies used in forecasting aviation activity and the results of those forecasts.

3.3.1 ASSUMPTIONS UNDERLYING THE FORECAST

The forecasts of enplaned passengers and aircraft operations were based on many underlying assumptions, including the following:

- Global Assumptions:
  - While year-to-year fluctuations in economic activity are likely, the historical long-term trends of generally expanding economic activity, both nationally and within the State of Hawaii, will continue through the forecast period, resulting in increased demand for air service.
  - Additional airline consolidation/mergers that may occur during the forecast period are not likely to affect the numbers of enplaned passengers at the Airport. New airline alliances, should they develop, would be restricted to code-sharing and joint frequent flyer programs, and they would not reduce airline competition at the Airport.
  - Domestic carriers will remain disciplined in capacity additions and reductions, due to recent industry consolidation and mergers, as discussed in Section 3.2.4. Domestic carriers may add, reduce, or eliminate service over the forecast period; however, forecast domestic passenger operations are expected to increase gradually as airlines continue to track toward financial rather than market share targets.
  - For these analyses, and similar to the FAA's assumptions for its nationwide forecasts, no terrorist incidents that materially impact US air traffic demand during the forecast period are anticipated to occur. Additionally, airline bankruptcies and industry consolidation, which would result in a major contraction within the aviation industry, were not assumed during the forecast period.
  - It was assumed that no major "acts of God" that may disrupt the national or global airspace system will occur during the forecast period that would negatively affect aviation activity.
- Local Assumptions:
  - The Airport will continue its role of primarily serving O&D passengers. Airlines will continue to operate as efficiently as possible, actively managing capacity and seeking to maintain or increase load factors on flights.
  - The air service profile presented in current airline schedules for Southwest Airlines is assumed to be representative of its future network and will have a larger impact in early years of the forecast.

Many factors influencing aviation activity cannot be quantified, and any forecast is subject to uncertainties. As a result, the forecasting process should not be viewed as precise. Actual airline traffic at the Airport may differ from the forecasts presented herein, because events and circumstances do not occur as expected, and those differences may be material.

3.3.2 PASSENGER FORECAST METHODOLOGY AND RESULTS

The following forecasts of total enplaned passengers at the Airport both comprise of a short-term forecast for CY 2019 and CY 2020, based on published passenger airline schedule data, and a long-term forecast through CY 2038. The short-term forecasts for CY 2019 and CY 2020 were based on published schedule data and forecast load factors. The long-term forecasts through CY 2038 were developed using socioeconomic regression analyses.

3.3.2.1 SCENARIO A FORECAST

The initial forecast scenario, referred to as Scenario A, is an estimation of O&D passengers based on socioeconomic regression analysis. Historical O&D passengers and revenues were analyzed to identify their relationship with socioeconomic variables at the national level, as well as for the State of Hawaii and Kauai. Socioeconomic variables, such as GRP, per capita personal income, employment, and population, are traditionally considered to be good indicators of passenger demand; they were analyzed to identify relationships with historical O&D passenger activity at the Airport. Historical and projected socioeconomic data were obtained from the Kauai General Plan, the Hawaii Department of Business, Economic Development & Tourism (DBEDT) State of Hawaii Data Book, and Woods & Poole Economics, Inc. **Table 3-15** presents the selected metrics. Regression analysis was used to identify predictive relationships between passenger demand and these socioeconomic variables.

Predictive relationships between the Airport O&D passenger volumes and socioeconomic elements were not adequate for use in forecasting future O&D traffic. While the analysis of O&D passengers did not identify a strong fit with socioeconomic trends, the analysis of passenger revenues identified much stronger predictive relationships with the local and national variables considered. **Table 3-16** presents the Scenario A regression analysis results of domestic O&D revenues and the resulting 2018 to 2038 CAGR of revenues for each variable.

To derive passenger volume growth associated with the range of forecast passenger revenue growth, a forecast of average fares for each year of the forecast period was developed to convert the revenue forecast to enplaned passengers. The average fares used to convert the forecast of O&D passenger revenues to O&D enplaned passengers was also calibrated based on the projected year-over-year changes in the price of fuel per the FAA 2018 Aerospace Forecast.

O&D passenger share of total enplaned passengers is expected to slightly increase over the forecast period from 96.4 percent in 2018 to 97.3 percent in 2038, and this assumption was used to derive an estimate of total enplaned passengers for air carrier and air taxi operations, which increase at a CAGR of 2.3 percent between 2018 and 2038. **Table 3-17** presents the historical and Scenario A Forecast of Enplaned Passengers.

3.3.2.2 SCENARIO B FORECAST OF DEMAND

While the Scenario A forecast provides a reasonable projection of enplaned passengers through the forecast period, a second scenario was explored as a result of feedback from the local community on Kauai. A Technical Advisory Committee (TAC) meeting was held with local elected officials, community representatives, and on July 12, 2019 and served as an introduction to the Master Plan. At that meeting, local representatives and members of the TAC and public raised concerns regarding the challenges of supporting existing tourism levels with the current infrastructure on the Island of Kauai and the pressure tourism has on local resources. While it was noted that forecast is attempting to project the demand regardless of whether there is infrastructure and that the master plan attempts to assess if the airport is ready to meet that demand, considerations were given to specific local socioeconomic data to more closely align with local dynamics affecting air travel demand and a second forecast scenario, Scenario B, was developed.

Like the Scenario A forecast, the Scenario B forecast is an estimation of O&D passengers based on socioeconomic regression analysis. Historical O&D enplaned passengers and revenues were analyzed to identify their relationship with socioeconomic variables at the State of Hawaii and Kauai levels. Independent variables considered for this analysis include only the local socioeconomic variables, which correlate with unique tourism characteristics of Kauai and align closely with the local infrastructure that supports tourism in Kauai. Socioeconomic variables, such as visitor units, visitor census (average daily visitors), visitor arrivals, and visitor days, were analyzed to identify relationships with historical O&D passenger activity at the Airport. Historical and projected socioeconomic data were obtained from the Kauai General Plan and the DBEDT; these data are presented in **Table 3-18**. Additional sources such as the Kauai Tourism Strategic Plan and the County of Kauai Short-Range Shuttle Plan were considered. However, these sources utilize the socioeconomic projections from the Kauai General Plan. Woods and Poole socioeconomic data considers national trends, not just those specific to the State of Hawaii or Kauai and were not used in the development of Scenario B to maintain consistency with the objective of exclusively using local socioeconomic variables and local plans.

TABLE 3-15 (1 OF 2) HISTORICAL AND PROJECTED SOCIOECONOMIC VARIABLES – SCENARIO A

	WOODS & POOLE ECONOMICS, INC.											
YEAR	TOTAL POPULATION NATIONAL (THOUSANDS)	TOTAL POPULATION HAWAII (THOUSANDS)	TOTAL EMPLOYMENT NATIONAL (THOUSANDS)	TOTAL EMPLOYMENT HAWAII (THOUSANDS)	TOTAL EARNING NATIONAL (USD MILLIONS)	TOTAL EARNING HAWAII (USD MILLIONS)	TOTAL PERSONAL INCOME NATIONAL (USD MILLIONS)	TOTAL PERSONAL INCOME ALL HAWAII (USD MILLIONS)	TOTAL PERSONAL INCOME PER CAPITA NATIONAL (USD)	TOTAL PERSONAL INCOME PER CAPITA HAWAII (USD)	TOTAL GDP NATIONAL (USD MILLIONS)	TOTAL GRP HAWAII (USD MILLIONS)
Historical												
2009	306,771	1,347	174,234	833	8,743,722	40,288	12,079,444	55,853	39,376	41,473	14,320,115	65,382
2010	309,348	1,364	173,035	825	8,829,868	40,045	12,257,005	55,983	39,622	41,045	14,618,132	67,116
2011	311,663	1,378	176,279	836	9,017,120	40,527	12,706,253	56,719	40,769	41,164	14,792,272	67,228
2012	313,998	1,392	179,082	850	9,272,654	41,654	13,102,482	58,269	41,728	41,866	15,115,991	68,348
2013	316,205	1,406	182,408	868	9,412,786	42,242	13,083,510	58,387	41,377	41,513	15,415,632	69,403
2014	318,563	1,416	186,355	883	9,678,829	43,259	13,568,885	60,575	42,594	42,778	15,860,078	70,683
2015	320,899	1,427	190,423	902	10,067,003	45,228	14,201,241	63,607	44,255	44,565	16,447,679	74,666
2016	323,132	1,433	193,668	914	10,203,884	46,249	14,363,146	64,940	44,450	45,306	16,708,790	76,425
2017	325,888	1,447	198,990	946	10,475,887	47,294	14,773,992	66,766	45,335	46,130	17,204,393	78,336
2018	328,911	1,462	202,638	966	10,722,936	48,538	15,161,771	68,653	46,097	46,943	17,602,878	80,441
Projected												
2019	331,969	1,478	205,736	982	10,941,891	49,637	15,519,764	70,382	46,751	47,626	17,957,335	82,309
2020	335,058	1,493	208,570	998	11,144,750	50,631	15,864,181	72,015	47,348	48,227	18,287,087	84,004
2021	338,177	1,509	211,558	1,014	11,344,322	51,593	16,203,700	73,611	47,915	48,786	18,614,867	85,646
2022	341,328	1,525	214,599	1,030	11,548,203	52,578	16,554,354	75,264	48,500	49,367	18,949,785	87,327
2023	344,505	1,540	217,445	1,045	11,755,010	53,559	16,908,591	76,920	49,081	49,934	19,286,327	89,003
2024	347,712	1,556	220,327	1,060	11,964,181	54,549	17,264,076	78,582	49,651	50,489	19,626,972	90,693
2025	350,937	1,572	223,254	1,075	12,175,743	55,548	17,628,555	80,283	50,233	51,055	19,971,767	92,399
2026	354,177	1,589	226,217	1,091	12,389,393	56,556	17,991,563	81,980	50,798	51,605	20,320,187	94,119
2027	357,430	1,605	229,158	1,106	12,604,888	57,567	18,351,055	83,658	51,342	52,131	20,671,067	95,845
2028	360,689	1,621	232,065	1,121	12,822,036	58,578	18,710,033	85,330	51,873	52,642	21,023,958	97,571
2029	363,960	1,637	234,965	1,136	13,040,438	59,588	19,068,275	86,994	52,391	53,136	21,378,635	99,294
2030	367,239	1,653	237,848	1,151	13,259,713	60,593	19,420,444	88,625	52,882	53,600	21,734,514	101,008
2031	370,478	1,670	240,694	1,165	13,479,134	61,589	19,756,610	90,181	53,327	54,015	22,090,261	102,708
2032	373,667	1,685	243,485	1,179	13,698,171	62,571	20,085,547	91,695	53,753	54,405	22,444,882	104,382
2033	376,816	1,701	246,223	1,193	13,916,742	63,538	20,412,242	93,189	54,170	54,783	22,798,304	106,032
2034	379,926	1,717	248,918	1,206	14,135,088	64,494	20,740,990	94,683	54,592	55,160	23,150,938	107,663
2035	382,998	1,732	251,572	1,219	14,353,553	65,440	21,079,895	96,211	55,039	55,555	23,503,297	109,275
2036	386,038	1,747	254,184	1,231	14,572,063	66,377	21,414,227	97,711	55,472	55,933	23,855,200	110,870
2037	389,046	1,762	256,759	1,244	14,790,701	67,309	21,734,031	99,143	55,865	56,271	24,206,857	112,457
2038	392,027	1,777	259,306	1,256	15,009,708	68,241	22,042,756	100,524	56,228	56,579	24,558,722	114,044
Compound Annual Growth Rate												
2009 – 2018	0.8%	0.9%	1.7%	1.7%	2.3%	2.1%	2.6%	2.3%	1.8%	1.4%	2.3%	2.3%
2018 – 2023	0.9%	1.0%	1.4%	1.6%	1.9%	2.0%	2.2%	2.3%	1.3%	1.2%	1.8%	2.0%
2018 – 2028	0.9%	1.0%	1.4%	1.5%	1.8%	1.9%	2.1%	2.2%	1.2%	1.2%	1.8%	1.9%
2028 – 2038	0.8%	0.9%	1.1%	1.1%	1.6%	1.5%	1.7%	1.7%	0.8%	0.7%	1.6%	1.6%
2018 – 2038	0.9%	1.0%	1.2%	1.3%	1.7%	1.7%	1.9%	1.9%	1.0%	0.9%	1.7%	1.8%

TABLE 3-15 (2 OF 2) HISTORICAL AND PROJECTED SOCIOECONOMIC VARIABLES – SCENARIO A

	DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM						KAUAI GENERAL PLAN					
YEAR	HAWAII STATE NUMBER OF WAGE AND SALARY JOBS (THOUSANDS)	HAWAII STATE PERSONAL INCOME (USD MILLIONS)	KAUAI COUNTY PERSONAL INCOME (USD MILLIONS)	HAWAII STATE VISITOR ARRIVALS BY AIR (THOUSANDS)	HAWAII STATE VISITOR DAYS BY AIR (THOUSANDS)	KAUAI COUNTY VISITOR DAYS BY AIR (THOUSANDS)	POPULATION OF KAUAI COUNTY	HOUSEHOLDS OF KAUAI COUNTY	TOTAL WAGE AND SALARY JOBS IN KAUAI COUNTY (USD)	HOUSING UNITS IN KAUAI COUNTY	VISITOR UNITS IN KAUAI COUNTY	AVERAGE VISITOR CENSUS COUNTY OF KAUAI
Historical												
2009	612,100	60,569	2,526	6,420	60,255	6,822	66,174	22,936	27,986	29,314	9,099	19,392
2010	605,593	60,447	2,503	6,917	64,951	7,135	67,091	23,240	28,150	29,793	9,345	19,548
2011	615,827	61,649	2,578	7,234	67,404	7,461	67,815	23,493	28,504	30,149	9,484	19,959
2012	626,061	62,851	2,653	7,552	69,857	7,787	68,547	23,750	28,863	30,510	9,625	20,379
2013	636,296	64,053	2,728	7,869	72,310	8,114	69,287	24,009	29,226	30,874	9,767	20,807
2014	646,530	65,255	2,803	8,187	74,763	8,440	70,034	24,270	29,594	31,244	9,912	21,244
2015	656,764	66,457	2,877	8,504	77,216	8,766	70,790	24,535	29,966	31,617	10,060	21,691
2016	666,998	67,659	2,952	8,822	79,669	9,092	71,554	24,802	30,344	31,995	10,209	22,147
2017	672,159	69,101	3,027	9,065	81,855	9,360	72,326	25,073	30,725	32,378	10,361	22,613
2018	677,319	70,544	3,101	9,309	84,041	9,627	73,107	25,346	31,112	32,765	10,514	23,088
Projected												
2019	682,480	71,987	3,176	9,552	86,228	9,895	73,896	25,623	31,504	33,157	10,671	23,573
2020	687,640	73,430	3,250	9,795	88,414	10,162	74,693	25,902	31,900	33,553	10,829	24,069
2021	692,442	75,030	3,332	9,891	89,238	10,275	75,515	26,177	32,104	33,930	10,871	24,231
2022	697,244	76,630	3,414	9,987	90,062	10,389	76,345	26,455	32,309	34,311	10,913	24,394
2023	702,046	78,230	3,496	10,083	90,886	10,502	77,185	26,736	32,516	34,697	10,955	24,558
2024	706,848	79,830	3,578	10,179	91,710	10,616	78,034	27,020	32,724	35,086	10,997	24,723
2025	711,650	81,430	3,660	10,275	92,534	10,729	78,892	27,307	32,933	35,481	11,039	24,890
2026	716,118	83,136	3,748	10,375	93,461	10,856	79,760	27,597	33,144	35,879	11,082	25,057
2027	720,586	84,842	3,836	10,476	94,388	10,984	80,638	27,890	33,356	36,282	11,125	25,225
2028	725,054	86,548	3,924	10,576	95,315	11,111	81,525	28,186	33,569	36,690	11,168	25,395
2029	729,522	88,254	4,012	10,677	96,242	11,238	82,421	28,485	33,784	37,102	11,211	25,566
2030	733,990	89,960	4,100	10,777	97,169	11,365	83,328	28,788	34,000	37,519	11,254	25,738
2031	737,730	91,756	4,200	10,876	98,082	11,492	84,245	29,094	34,178	37,941	11,297	25,906
2032	741,470	93,552	4,300	10,975	98,995	11,620	85,171	29,403	34,357	38,367	11,340	26,075
2033	745,210	95,348	4,400	11,074	99,908	11,747	86,108	29,715	34,537	38,799	11,384	26,245
2034	748,950	97,144	4,500	11,173	100,821	11,875	87,055	30,030	34,718	39,235	11,427	26,417
2035	752,690	98,940	4,600	11,271	101,734	12,002	88,013	30,349	34,900	39,676	11,471	26,589
2036	755,900	100,842	4,708	11,363	102,584	12,124	88,981	30,671	35,083	40,122	11,515	26,763
2037	759,110	102,744	4,816	11,455	103,435	12,246	89,960	30,997	35,267	40,573	11,559	26,937
2038	762,320	104,646	4,924	11,546	104,285	12,367	90,950	31,326	35,451	41,029	11,603	27,113
Compound Annual Growth Rate												
2009 – 2018	1.1%	1.7%	2.3%	4.2%	3.8%	3.9%	1.1%	1.1%	1.2%	1.2%	1.6%	2.0%
2018 – 2023	0.7%	2.1%	2.4%	1.6%	1.6%	1.8%	1.1%	1.1%	0.9%	1.2%	0.8%	1.2%
2018 – 2028	0.7%	2.1%	2.4%	1.3%	1.3%	1.4%	1.1%	1.1%	0.8%	1.1%	0.6%	1.0%
2028 – 2038	0.5%	1.9%	2.3%	0.9%	0.9%	1.1%	1.1%	1.1%	0.5%	1.1%	0.4%	0.7%
2018 – 2038	0.6%	2.0%	2.3%	1.1%	1.1%	1.3%	1.1%	1.1%	0.7%	1.1%	0.5%	0.8%

NOTE: GRP – Gross Regional Product

SOURCES: Kauai General Plan Forecast, August 2018; Department of Business, Economic Development & Tourism Forecast, August 2019.

TABLE 3-16 DOMESTIC ORIGIN AND DESTINATION PASSENGER REVENUE FORECAST REGRESSION ANALYSIS RESULTS – SCENARIO A

PASSENGER DEMAND ELEMENT	SOURCES	INDEPENDENT VARIABLE	R-SQUARED	2018 TO 2038 COMPOUND ANNUAL GROWTH RATE RANGE
Domestic O&D Passenger Revenue	Kauai General Plan	Population of Kauai County	95.2%	3.1%
		Households of Kauai County	95.5%	3.1%
		Total Wage and Salary Jobs in Kauai County	96.3%	2.5%
		Housing Units in Kauai County	94.8%	2.9%
		Visitor Units in Kauai County	93.1%	1.0%
		Average Visitor Census County of Kauai	95.0%	2.1%
	Department of Business, Economic Development & Tourism	Hawaii State Number of Wage and Salary Jobs	89.0%	2.2%
		Hawaii State Personal Income	94.8%	4.3%
		Kauai County Personal Income	90.9%	4.3%
		Hawaii State Visitor Arrivals by Air	96.4%	1.9%
		Hawaii State Visitor Days by Air	96.0%	2.0%
		Kauai County Visitor Days by Air	88.1%	2.1%
	Woods & Poole Economics, Inc.	Total Population National	95.1%	3.4%
		Total Population Hawaii	95.0%	3.2%
		Total Employment National	90.4%	3.4%
		Total Employment Hawaii	88.7%	3.3%
		Total Earning National	93.5%	3.7%
		Total Earning Hawaii	89.1%	3.3%
		Total Personal Income National	96.4%	3.5%
		Total Personal Income All Hawaii	93.2%	3.2%
		Total Personal Income Per Capita National	93.3%	2.8%
		Total Personal Income Per Capita Hawaii	87.1%	2.4%
		Total GRP National	94.4%	3.3%
		Total GRP Hawaii	89.3%	3.0%

NOTES: O&D – Origin and Destination; GRP – Gross Regional Product

SOURCES: Kauai General Plan, August 2018; Department of Business, Economic Development & Tourism, August 2019; Woods & Poole Economics, Inc., June 2019 (socioeconomic variables); Ricondo & Associates, Inc., August 2019 (analysis).

TABLE 3-17 HISTORICAL AND SCENARIO A FORECAST OF ENPLANED PASSENGERS

YEAR	DOMESTIC O&D PASSENGERS	INTERNATIONAL O&D PASSENGERS	TOTAL O&D PASSENGERS	CONNECTING PASSENGERS	TOTAL ENPLANED PASSENGERS	TOTAL ENPLANED PASSENGERS
Historical						
2009	1,201,040	21,486	1,222,526	20,066	1,242,592	
2010	1,155,545	27,340	1,182,885	24,205	1,207,090	-2.9%
2011	1,177,531	32,440	1,209,972	25,551	1,235,523	2.4%
2012	1,256,298	41,557	1,297,855	30,336	1,328,191	7.5%
2013	1,281,395	45,378	1,326,772	30,791	1,357,563	2.2%
2014	1,284,017	47,048	1,331,065	29,677	1,360,742	0.2%
2015	1,331,464	46,753	1,378,217	30,847	1,409,064	3.6%
2016	1,400,064	44,035	1,444,099	33,586	1,477,685	4.9%
2017	1,481,391	48,748	1,530,139	50,959	1,581,098	7.0%
2018	1,588,374	52,558	1,640,519	61,771	1,702,290	7.7%
Forecast						
2019	1,539,548	50,532	1,590,080	59,001	1,649,081	-3.1%
2020	1,754,872	57,132	1,812,004	66,261	1,878,265	13.9%
2021	1,804,642	58,271	1,862,913	67,192	1,930,105	2.8%
2022	1,854,657	59,392	1,914,049	68,079	1,982,128	2.7%
2023	1,903,486	60,449	1,963,934	68,871	2,032,806	2.6%
2024	1,951,855	61,466	2,013,320	69,597	2,082,917	2.5%
2025	2,000,130	62,454	2,062,584	70,268	2,132,853	2.4%
2026	2,048,647	63,424	2,112,071	70,898	2,182,969	2.3%
2027	2,096,306	64,343	2,160,649	71,448	2,232,098	2.3%
2028	2,143,152	65,212	2,208,364	71,922	2,280,286	2.2%
2029	2,189,248	66,033	2,255,281	72,322	2,327,604	2.1%
2030	2,234,344	66,801	2,301,145	72,643	2,373,787	2.0%
2031	2,277,982	67,502	2,345,484	72,870	2,418,353	1.9%
2032	2,320,388	68,144	2,388,532	73,013	2,461,545	1.8%
2033	2,361,786	68,734	2,430,520	73,081	2,503,601	1.7%
2034	2,402,414	69,280	2,471,695	73,083	2,544,778	1.6%
2035	2,442,593	69,793	2,512,386	73,030	2,585,416	1.6%
2036	2,481,946	70,261	2,552,207	72,912	2,625,119	1.5%
2037	2,520,054	70,674	2,590,728	72,717	2,663,445	1.5%
2038	2,557,141	71,038	2,628,179	72,454	2,700,633	1.4%
Compound Annual Growth Rate						
2009 – 2018	3.2%	10.4%	3.3%	13.3%	3.6%	
2018 – 2023	3.7%	2.8%	3.7%	2.2%	3.6%	
2018 – 2028	3.0%	2.2%	3.0%	1.5%	3.0%	
2028 – 2038	1.8%	0.9%	1.8%	0.1%	1.7%	
2018 – 2038	2.4%	1.5%	2.4%	0.8%	2.3%	

NOTES: O&D – Origin and Destination
Table columns and rows may not add up to Airport and Airline totals due to rounding.
Enplaned passenger annual totals include air carrier and air taxi enplaned passengers.
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical total enplaned passengers); US Department of Transportation, Origin and Destination Survey, August 2019 (historical segmentation of passengers); Ricondo & Associates, Inc., August 2019 (forecast enplaned passengers).

TABLE 3-18 HISTORICAL AND PROJECTED SOCIOECONOMIC VARIABLES – SCENARIO B

YEAR	KAUAI GENERAL PLAN		DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM		
	VISITOR UNITS IN KAUAI COUNTY	AVERAGE VISITOR CENSUS COUNTY OF KAUAI	HAWAII STATE VISITOR ARRIVALS BY AIR (THOUSANDS)	HAWAII STATE VISITOR DAYS BY AIR (THOUSANDS)	KAUAI COUNTY VISITOR DAYS BY AIR (THOUSANDS)
Historical					
2009	9,099	19,392	6,420	60,255	6,822
2010	9,345	19,548	6,917	64,951	7,135
2011	9,484	19,959	7,174	67,826	7,597
2012	9,625	20,379	7,867	73,664	8,169
2013	9,767	20,807	8,003	74,050	8,517
2014	9,912	21,244	8,196	75,269	8,620
2015	10,060	21,691	8,563	78,086	8,955
2016	10,209	22,147	8,822	79,669	9,092
2017	10,361	22,613	9,257	83,412	9,590
2018	10,514	23,088	9,309	84,041	9,627
Projected					
2019	10,671	23,573	9,552	86,228	9,895
2020	10,829	24,069	9,795	88,414	10,162
2021	10,871	24,231	9,891	89,238	10,275
2022	10,913	24,394	9,987	90,062	10,389
2023	10,955	24,558	10,083	90,886	10,502
2024	10,997	24,723	10,179	91,710	10,616
2025	11,039	24,890	10,275	92,534	10,729
2026	11,082	25,057	10,375	93,461	10,856
2027	11,125	25,225	10,476	94,388	10,984
2028	11,168	25,395	10,576	95,315	11,111
2029	11,211	25,566	10,677	96,242	11,238
2030	11,254	25,738	10,777	97,169	11,365
2031	11,297	25,906	10,876	98,082	11,492
2032	11,340	26,075	10,975	98,995	11,620
2033	11,384	26,245	11,074	99,908	11,747
2034	11,427	26,417	11,173	100,821	11,875
2035	11,471	26,589	11,271	101,734	12,002
2036	11,515	26,763	11,363	102,584	12,124
2037	11,559	26,937	11,455	103,435	12,246
2038	11,603	27,113	11,546	104,285	12,367
Compound Annual Growth Rate					
2009 – 2018	1.6%	2.0%	4.2%	3.8%	3.9%
2018 – 2023	0.8%	1.2%	1.6%	1.6%	1.8%
2018 – 2028	0.6%	1.0%	1.3%	1.3%	1.4%
2028 – 2038	0.4%	0.7%	0.9%	0.9%	1.1%
2018 – 2038	0.5%	0.8%	1.1%	1.1%	1.3%

SOURCES: Kauai General Plan Forecast, August 2018; Department of Business, Economic Development & Tourism Forecast, August 2019.

Regression analysis was used to identify predictive relationships between passenger demand and these socioeconomic variables. A standard measure of how well each variable explains passenger demand is the regression model's coefficient of determination, or R-squared value. A result of 100 percent is the maximum value possible; it represents a perfect fit between the variables analyzed. For purposes of this analysis, an R-squared value of 80 percent or better was considered adequate. Due to the fluctuations in seat capacity and carriers serving the Airport over the past 20 years, as discussed in Section 3.1, the historical passenger traffic patterns at the Airport do not align well with local trends. As a result, predictive relationships between the Airport O&D passenger volumes and socioeconomic elements were not adequate for use in forecasting future O&D traffic.

While the analysis of O&D passengers did not identify a strong fit with socioeconomic tends, the analysis of O&D passenger revenues identified much stronger predictive relationships with the local variables considered. **Table 3-19** presents the Scenario B regression analysis results of domestic O&D revenues and the resulting 2018 to 2038 CAGR of revenues for each variable.

TABLE 3-19 DOMESTIC ORIGIN AND DESTINATION PASSENGER REVENUE FORECAST REGRESSION ANALYSIS RESULTS – SCENARIO B

PASSENGER DEMAND ELEMENT	SOURCES	INDEPENDENT VARIABLE	R-SQUARED	2018 TO 2038 COMPOUND ANNUAL GROWTH RATE RANGE
Domestic O&D Passenger Revenue	Kauai General Plan	Visitor Units in Kauai County	93.1%	1.0%
		Average Visitor Census County of Kauai	95.0%	2.1%
	Department of Business, Economic Development & Tourism	Hawaii State Visitor Arrivals by Air	96.4%	1.9%
		Hawaii State Visitor Days by Air	96.0%	2.0%
		Kauai County Visitor Days by Air	88.1%	2.1%

NOTE: O&D – Origin and Destination

SOURCES: Kauai General Plan, August 2018; Department of Business, Economic Development & Tourism, August 2019 (socioeconomic variables); Ricondo & Associates, Inc., August 2019 (analysis).

To derive passenger volume growth associated with the range of forecast passenger revenue growth, a second step was necessary to estimate how airlines might capture that revenue at the Airport, through a combination of passenger volume growth and/or passenger fare growth. A forecast of average fares for each year of the forecast periods was developed to convert the revenue forecast to enplaned passengers. The average fares were estimated based on the assumption that airlines manage pricing and inventory levels with the objective of offsetting higher passenger carrying costs with higher fares. Conversely, decreases in carrying costs enable airlines to profitably expand capacity and carry increased passenger volumes at lower fares. While total passenger carrying costs comprise many components, fuel has been the first or second largest operating expense for the airline industry, alternating with labor expense. According to the International Air Transport Association, fuel accounted for 23.5 percent of airline operating costs in 2018, and it is projected to increase to 25.0 percent in 2019.[4] Therefore, the average fares used to convert the forecast of O&D passenger revenues to O&D enplaned passengers were calibrated based on the projected year-over-year changes in the price of fuel per the FAA 2018 Aerospace Forecast. The annual estimated change in fuel prices was applied to the current average O&D fare to project average fares for each year of the forecast period. This approach allowed us to estimate the impact of increased fuel costs on average fares and derive the forecast passenger volumes by dividing total forecast revenue by the forecast average fare.

4 International Air Transport Association, *Fact Sheet–Fuel*, June 2019.

O&D passengers represented 96.4 percent of total enplaned passengers at the Airport in 2018. For the purposes of the Scenario B forecast, the share of O&D passengers is expected to slightly increase over the forecast period to 97.3 percent in 2038, as a result of more direct service to the US mainland focused on local O&D passenger demand. This assumption was used to derive an estimate of total enplaned O&D passengers for air carrier and air taxi operations. **Table 3-20** presents the Scenario B forecast of enplaned passengers, which increase at a CAGR of 1.4 percent between 2018 and 2038.

TABLE 3-20 HISTORICAL AND SCENARIO B FORECAST OF ENPLANED PASSENGERS

YEAR	DOMESTIC O&D PASSENGERS	INTERNATIONAL O&D PASSENGERS	TOTAL O&D PASSENGERS	CONNECTING PASSENGERS	TOTAL ENPLANED PASSENGERS	ANNUAL GROWTH
Historical						
2009	1,201,040	21,486	1,222,526	20,066	1,242,592	
2010	1,155,545	27,340	1,182,885	24,205	1,207,090	-2.9%
2011	1,177,531	32,440	1,209,972	25,551	1,235,523	2.4%
2012	1,256,298	41,557	1,297,855	30,336	1,328,191	7.5%
2013	1,281,395	45,378	1,326,772	30,791	1,357,563	2.2%
2014	1,284,017	47,048	1,331,065	29,677	1,360,742	0.2%
2015	1,331,464	46,753	1,378,217	30,847	1,409,064	3.6%
2016	1,400,064	44,035	1,444,099	33,586	1,477,685	4.9%
2017	1,481,391	48,748	1,530,139	50,959	1,581,098	7.0%
2018	1,588,374	52,558	1,640,932	61,771	1,702,290	7.7%
Forecast						
2019	1,539,946	50,134	1,590,080	59,001	1,649,081	-3.1%
2020	1,757,644	54,360	1,812,004	66,261	1,878,265	13.9%
2021	1,836,009	56,296	1,892,305	68,252	1,960,557	4.4%
2022	1,853,815	56,350	1,910,165	67,941	1,978,106	0.9%
2023	1,871,359	56,387	1,927,745	67,602	1,995,347	0.9%
2024	1,888,641	56,406	1,945,047	67,237	2,012,284	0.8%
2025	1,905,665	56,410	1,962,074	66,844	2,028,918	0.8%
2026	1,924,405	56,455	1,980,860	66,494	2,047,353	0.9%
2027	1,942,866	56,482	1,999,348	66,115	2,065,463	0.9%
2028	1,961,051	56,491	2,017,542	65,707	2,083,250	0.9%
2029	1,978,962	56,484	2,035,446	65,273	2,100,719	0.8%
2030	1,996,602	56,459	2,053,062	64,811	2,117,873	0.8%
2031	2,013,534	56,406	2,069,940	64,309	2,134,249	0.8%
2032	2,030,203	56,337	2,086,540	63,781	2,150,321	0.8%
2033	2,046,613	56,252	2,102,865	63,229	2,166,094	0.7%
2034	2,062,766	56,151	2,118,917	62,652	2,181,570	0.7%
2035	2,078,665	56,036	2,134,701	62,052	2,196,752	0.7%
2036	2,093,086	55,873	2,148,959	61,392	2,210,350	0.6%
2037	2,107,274	55,696	2,162,971	60,710	2,223,681	0.6%
2038	2,121,233	55,507	2,176,739	60,008	2,236,748	0.6%
Compound Annual Growth Rate						
2009 – 2018	3.2%	10.4%	3.3%	13.3%	3.6%	
2018 – 2023	3.3%	1.4%	3.3%	1.8%	3.2%	
2018 – 2028	2.1%	0.7%	2.1%	0.6%	2.0%	
2028 – 2038	0.8%	-0.2%	0.8%	-0.9%	0.7%	
2018 – 2038	1.5%	0.3%	1.4%	-0.1%	1.4%	

NOTE: O&D – Origin and Destination

Table columns and rows may not add up to Airport and Airline totals due to rounding.

Enplaned passenger annual totals include air carrier and air taxi enplaned passengers.

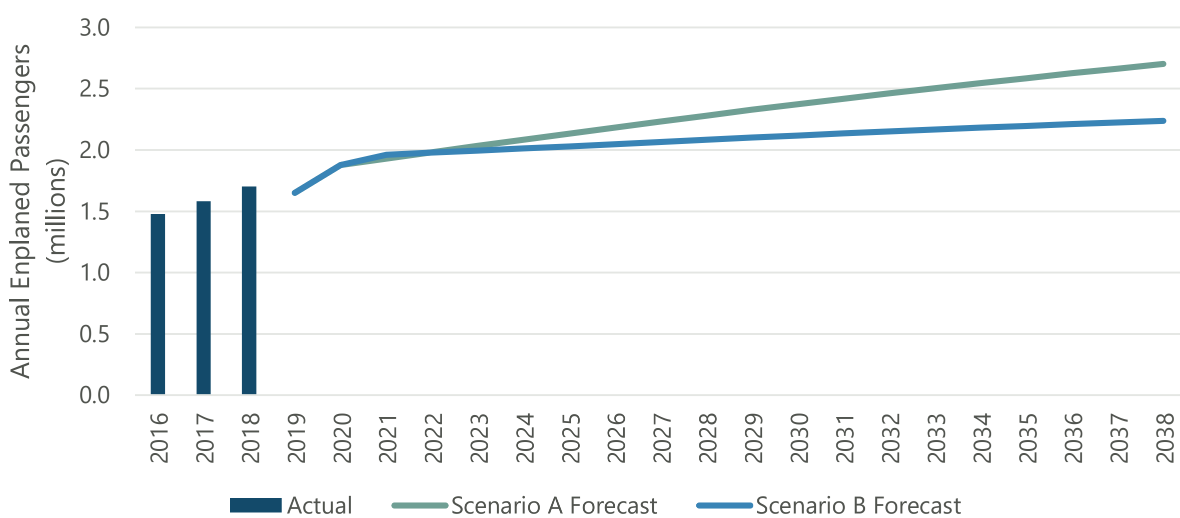
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical total enplaned passengers); US Department of Transportation, Origin and Destination Survey, August 2019 (historical segmentation of passengers); Ricondo & Associates, Inc., August 2019 (forecast enplaned passengers).

Exhibit 3-3 compares the Scenario A and Scenario B forecasts of enplaned passengers, and **Table 3-21** compares the two socioeconomic regression forecast results. The Scenario A and Scenario B forecasts closely align in the short-term forecast; however, the Scenario A forecast out paces the Scenario B forecast from CY 2022 through CY 2038. The short-term forecast for both scenarios considers the recently announced expansion of Southwest Airlines service to the Airport, and thus both forecasts are in sync through CY 2020.

Exhibit 3-4 presents the impact of Southwest Airlines' seat capacity in CY 2020 based upon published schedule data. Per announced seat capacity for CY 2020, Southwest Airlines increases seat capacity at the Airport by 15.2 percent, and over the same period enplaned passengers are forecast to increase 14.2 percent for both forecast scenarios.

A second TAC meeting was held the afternoon of October 30, 2019, followed by a public meeting that evening. Both the Scenario A and Scenario B forecasts, along with the supporting data were presented at the TAC and public meetings. Members of the TAC and the public again stated their concerns regarding the pressures that tourism has on infrastructure and resources on the island. In response, the Scenario B forecast was selected as the baseline forecast as it was developed using the same socioeconomic information used to develop the Kauai General Plan and subsequent plans as described previously. The Scenario A forecast has been maintained for planning purposes and is considered a high-scenario case.

EXHIBIT 3-3 COMPARISON OF SCENARIO A AND SCENARIO B ENPLANED PASSENGER FORECASTS



NOTE: Enplaned passengers annual totals include air carrier and air taxi enplaned passengers.
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical total enplaned passengers); Ricondo & Associates, Inc., August 2019 (forecast enplaned passengers).

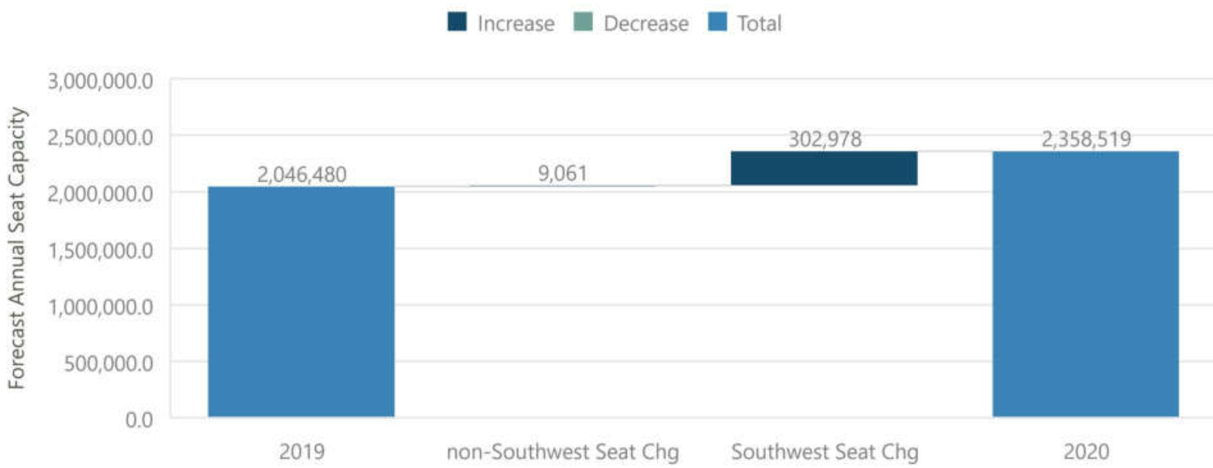
TABLE 3-21 COMPARISON OF SCENARIO A AND SCENARIO B FORECASTS

YEAR	SCENARIO A ENPLANED PASSENGERS	SCENARIO B ENPLANED PASSENGERS	SCENARIO A FORECAST COMPARED TO SCENARIO B
Historical			
2018	1,702,290	1,702,290	
Forecast			
2019	1,649,081	1,649,081	0.0%
2020	1,878,265	1,878,265	0.0%
2021	1,930,105	1,960,557	-1.6%
2022	1,982,128	1,978,106	0.2%
2023	2,032,806	1,995,347	1.9%
2024	2,082,917	2,012,284	3.5%
2025	2,132,853	2,028,918	5.1%
2026	2,182,969	2,047,353	6.6%
2027	2,232,098	2,065,463	8.1%
2028	2,280,286	2,083,250	9.5%
2029	2,327,604	2,100,719	10.8%
2030	2,373,787	2,117,873	12.1%
2031	2,418,353	2,134,249	13.3%
2032	2,461,545	2,150,321	14.5%
2033	2,503,601	2,166,094	15.6%
2034	2,544,778	2,181,570	16.6%
2035	2,585,416	2,196,752	17.7%
2036	2,625,119	2,210,350	18.8%
2037	2,663,445	2,223,681	19.8%
2038	2,700,633	2,236,748	20.7%
Compound Annual Growth Rate			
2018 – 2023	3.6%	3.2%	
2018 – 2028	3.0%	2.0%	
2028 – 2038	1.7%	0.7%	
2018 – 2038	2.3%	1.4%	

NOTE: Enplaned passenger annual totals include air carrier and air taxi enplaned passengers

SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical total enplaned passengers); US Department of Transportation, August 2019; Ricondo & Associates, Inc., August 2019 (forecast enplaned passengers).

EXHIBIT 3-4 SOUTHWEST AIRLINES SEAT CAPACITY IMPACT ON CALENDAR YEAR 2020 ENPLANED PASSENGER FORECASTS



SOURCES: Innovata, August 2019 (schedule data); Ricondo & Associates, Inc., August 2019 (forecast enplaned passengers).

3.4 OPERATIONS FORECAST

3.4.1 AIR CARRIER OPERATIONS

The air carrier operations forecast was developed in conjunction with the Scenario B forecast of enplaned passengers, which was based on the airlines operating at the Airport, their anticipated future fleet mix, and the assumptions on growth in average seats per departure and load factors. **Table 3-22** presents the historical and forecast air carrier operations, as well as the assumptions that were used to derive the enplaned passenger forecast such as load factor and average seats per departure. Between CY 2018 and CY 2038, air carrier operations are forecast to increase at a CAGR of 1.3 percent compared to 1.4 percent for enplaned passengers, due to a modest increase in average seats per departure, as a result of future airline aircraft orders of larger aircraft, and load factors, due to improved airline management of available seat capacity.

Air carrier operations are forecast to increase from approximately 27,412 in CY 2018 (37.6 average daily departures) to 35,455 in CY 2038 (48.6 average daily departures), a CAGR of 1.3 percent during that period. In general, the forecast number of air carrier operations between 2018 and 2038 was based on historical relationships among enplaned passengers, load factors, and average seating capacities of aircraft serving the Airport. While mainline carriers have historically kept their share of the market steady in terms of enplaned passengers and operations, Southwest Airlines' entry into the market will likely shift passenger share in the coming years. Hawaiian Airlines has not announced a replacement aircraft for the Boeing 717 aircraft, and its decision on a replacement aircraft for its interisland operations could also impact operations and airline market shares. As Hawaiian Airlines and other carriers adjust their operations with different aircraft and seat configurations, the average number of available seats per departure from the Airport is expected to increase. Air carrier share of total operations is forecast to increase slightly over the forecast period from approximately 21.3 percent (CY 2019) to 22.4 percent (CY 20238).

Table 3-23 presents historical and forecast aircraft operations at the Airport through CY 2038. Total Airport operations are forecast to increase to 158,454 in CY 2038. From CY 2018 to CY 2038, total Airport operations are forecast to increase at a CAGR of 1.0 percent. Each category (air carrier, air taxi, GA, and military) is discussed in further detail in the following subsection.

TABLE 3-22 HISTORICAL AND SCENARIO B FORECAST OF SCHEDULED AIR CARRIER OPERATIONS

YEAR	ENPLANED PASSENGERS	YEAR-OVER-YEAR CHANGE	AVERAGE LOAD FACTOR	AVERAGE SEATS PER DEPARTURE	AIR CARRIER OPERATIONS	YEAR-OVER-YEAR CHANGE
Historical						
2016	1,477,685	4.90%	78.0%	135	25,789	
2017	1,581,098	7.00%	78.0%	134	28,363	10.0%
2018	1,702,290	7.70%	77.0%	148	27,412	-3.4%
Forecast						
2019	1,649,081	-3.10%	80.0%	147	28,086	2.5%
2020	1,878,265	13.90%	79.5%	150	31,548	12.3%
2021	1,960,557	4.40%	79.6%	147	32,824	4.0%
2022	1,978,106	0.90%	79.7%	150	33,011	0.6%
2023	1,995,347	0.90%	79.8%	151	33,192	0.5%
2024	2,012,284	0.80%	79.9%	151	33,366	0.5%
2025	2,028,918	0.80%	80.0%	151	33,534	0.5%
2026	2,047,353	0.90%	80.1%	152	33,730	0.6%
2027	2,065,463	0.90%	80.2%	152	33,919	0.6%
2028	2,083,250	0.90%	80.3%	152	34,101	0.5%
2029	2,100,719	0.80%	80.4%	152	34,277	0.5%
2030	2,117,873	0.80%	80.5%	153	34,446	0.5%
2031	2,134,249	0.80%	80.6%	153	34,601	0.4%
2032	2,150,321	0.80%	80.7%	153	34,749	0.4%
2033	2,166,094	0.70%	80.8%	154	34,892	0.4%
2034	2,181,570	0.70%	80.9%	154	35,029	0.4%
2035	2,196,752	0.70%	81.0%	154	35,160	0.4%
2036	2,210,350	0.60%	81.1%	155	35,264	0.3%
2037	2,223,681	0.60%	81.2%	155	35,363	0.3%
2038	2,236,748	0.60%	81.3%	155	35,455	0.3%
Compound Annual Growth Rate						
2018 – 2023	3.2%		0.7%	0.4%	3.9%	
2018 – 2028	2.0%		0.4%	0.3%	2.2%	
2028 – 2038	0.7%		0.1%	0.2%	0.4%	
2018 – 2038	1.4%		0.3%	0.2%	1.3%	

NOTES: Load factor does not include nonrevenue passengers.

Enplaned passenger annual totals include air carrier and air taxi enplaned passengers

SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical total enplaned passengers); US Department of Transportation, Origin and Destination Survey, August 2019 (historical segmentation of passengers); Ricondo & Associates, Inc., August 2019 (forecast enplaned passengers).

TABLE 3-23 HISTORICAL AND FORECAST OPERATIONS BY OPERATOR CATEGORY

YEAR	AIR CARRIER	AIR TAXI	GENERAL AVIATION	MILITARY	TOTAL	ANNUAL GROWTH
Historical						
2009	21,015	51,207	20,459	6,490	99,171	
2010	22,779	46,619	33,207	4,210	106,815	7.7%
2011	25,517	55,732	26,503	5,592	113,344	6.1%
2012	28,522	62,482	23,746	3,681	118,431	4.5%
2013	26,194	68,938	24,857	6,313	126,302	6.6%
2014	25,849	65,151	29,771	5,806	126,577	0.2%
2015	23,598	77,497	24,659	6,644	132,398	4.6%
2016	25,789	76,263	22,956	4,495	129,503	-2.2%
2017	28,363	78,236	20,747	2,738	130,084	0.4%
2018	27,412	78,858	21,790	2,218	130,278	0.1%
Forecast						
2019	28,086	79,647	21,921	2,218	131,871	1.2%
2020	31,548	80,443	22,052	2,218	136,261	3.3%
2021	32,824	81,247	22,185	2,218	138,474	1.6%
2022	33,011	82,060	22,318	2,218	139,607	0.8%
2023	33,192	82,881	22,452	2,218	140,742	0.8%
2024	33,366	83,709	22,586	2,218	141,880	0.8%
2025	33,534	84,546	22,722	2,218	143,020	0.8%
2026	33,730	85,392	22,858	2,218	144,198	0.8%
2027	33,919	86,246	22,995	2,218	145,378	0.8%
2028	34,101	87,108	23,133	2,218	146,561	0.8%
2029	34,277	87,979	23,272	2,218	147,746	0.8%
2030	34,446	88,859	23,412	2,218	148,935	0.8%
2031	34,601	89,748	23,552	2,218	150,119	0.8%
2032	34,749	90,645	23,693	2,218	151,306	0.8%
2033	34,892	91,552	23,836	2,218	152,497	0.8%
2034	35,029	92,467	23,979	2,218	153,693	0.8%
2035	35,160	93,392	24,123	2,218	154,892	0.8%
2036	35,264	94,326	24,267	2,218	156,075	0.8%
2037	35,363	95,269	24,413	2,218	157,263	0.8%
2038	35,455	96,222	24,559	2,218	158,454	0.8%
Compound Annual Growth Rate						
2009 – 2018	3.0%	4.9%	0.7%	-11.2%	3.1%	---
2018 – 2023	3.9%	1.0%	0.6%	0.0%	1.6%	---
2018 – 2028	2.2%	1.0%	0.6%	0.0%	1.2%	---
2028 – 2038	0.4%	1.0%	0.6%	0.0%	0.8%	---
2018 – 2038	1.3%	1.0%	0.6%	0.0%	1.0%	---

NOTE: Table columns and rows may not add up to Airport and Airline totals due to rounding.
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019; Ricondo & Associates, Inc., August 2019 (projected).

3.4.2 GENERAL AVIATION, AIR TAXI, AND MILITARY OPERATIONS

GA and air taxi operations were analyzed for their historical relationship with socioeconomic factors, similar to the unconstrained O&D passenger forecast methodology. However, these analyses did not identify strong predictive relationships that could be used to forecast GA activity at the Airport. The Airport's historical GA and air taxi activity was compared to activity at the national and state level, as presented in the FAA's 2018 Aerospace Forecast, and the State of Hawaii generated similar growth trends in recent years.[5] Therefore, the State of Hawaii average forecast growth rates for each sector of activity were applied to independently forecast GA activity and air taxi activity at the Airport. Military operations for the year 2018 are assumed to remain constant through the forecast period. The GA, air taxi, and military operations forecast was not constrained by any considerations of airfield or facility limitations.

3.5 COMPARISON TO OTHER ACTIVITY FORECASTS

Table 3-24 compares the Scenario B enplaned passenger forecast to the 2019 Terminal Area Forecast (TAF) for the Airport and **Exhibit 3-5** compares the Scenario B enplaned passenger forecast to the 2019 TAF for the Airport in graphic form. For the period from 2018 to 2038, the Scenario B forecast identifies a CAGR of 1.4 percent compared to 1.9 percent for the TAF. The Scenario B enplaned passenger forecast is within the 5- and 10-year tolerance levels of the 2019 TAF. By the end of the forecast period in CY 2038, the Scenario B forecast is 6.2 percent lower than the 2019 FAA TAF.

Table 3-25 compares the Scenario B total Airport operations forecast to the 2019 TAF for the Airport. **Exhibit 3-6** presents the same information in graphic form. For the period from 2018 to 2038, the total Airport operations forecast identifies a CAGR of 1.0 percent, which aligns with the 1.0 percent for the TAF. The total Airport operations forecast remains within the 5- and 10-year tolerance levels of the 2019 TAF.

3.6 CARGO FORECAST

This section presents historical air cargo data, an analysis of the composition of the market, and a description of the current and future competitive landscape. These factors were all considered in the development of the Scenario A and Scenario B forecasts of future air cargo activity at the Airport.

3.6.1 AIR CARGO OVERVIEW AND INDUSTRY TRENDS

The global air cargo industry has undergone a major transformation over the past two decades. In the early 2000s, the e-commerce, or e-tailing, revolution was just materializing. It was far from certain that many of the integrated carriers, companies, and cargo operators, such as UPS, FedEx, or DHL, who provide fully integrated door-to-door transportation/logistics services, would embrace home delivery due to the high cost associated with the number of undelivered parcels caused by not-at-home end-recipients. Higher margin business-to-business services, especially in the buoyant economic years preceding the recession of 2008, drove innovation in the industry, with huge corporate budgets resulting in initiatives such as electronic proof-of-delivery notes, providing for greater levels of visibility in the supply chain. Business-to-consumer home delivery companies, often off-shoots of traditional home shopping, and catalogue retailers were a separate sector. Today, it is difficult to convey the impact business-to-consumer e-commerce is having on the operational and technological focus of the major cargo operators, as business-to-consumer ecommerce is playing a larger role is their thinking and revenues.

[5] Federal Aviation Administration, *2018 Aerospace Forecast*, May 2019.

TABLE 3-24 ENPLANED PASSENGER FORECAST COMPARISON

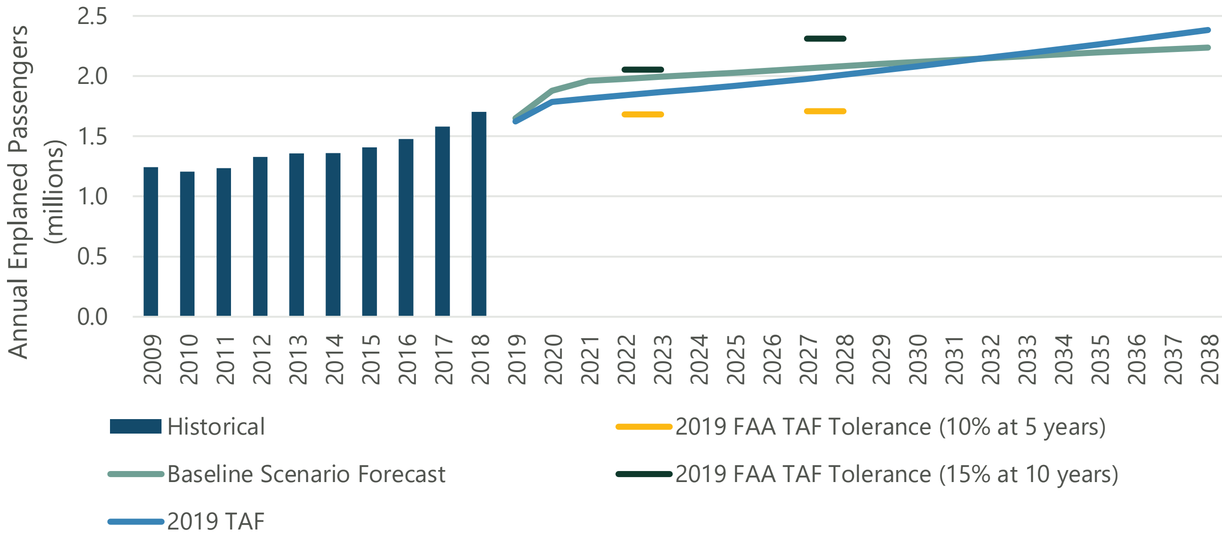
YEAR	HISTORICAL / SCENARIO B FORECAST	2019 FAA TAF	VARIANCE OF ACTUAL / FORECAST VERSUS TAF
Historical			
2009	1,242,592	1,208,065	2.9%
2010	1,207,090	1,170,083	3.2%
2011	1,235,523	1,193,230	3.5%
2012	1,328,191	1,265,166	5.0%
2013	1,357,563	1,321,079	2.8%
2014	1,360,742	1,303,431	4.4%
2015	1,409,064	1,359,989	3.6%
2016	1,477,685	1,411,256	4.7%
2017	1,581,098	1,497,453	5.6%
2018	1,702,290	1,623,358	5.0%
Forecast			
2019	1,649,081	1,623,802	1.6%
2020	1,878,265	1,785,461	5.2%
2021	1,960,557	1,814,455	8.1%
2022	1,978,106	1,842,069	7.4%
2023	1,995,347	1,867,568	6.8%
2024	2,012,284	1,892,588	6.3%
2025	2,028,918	1,919,522	5.7%
2026	2,047,353	1,948,847	5.1%
2027	2,065,463	1,977,947	4.4%
2028	2,083,250	2,010,574	3.6%
2029	2,100,719	2,045,003	2.7%
2030	2,117,873	2,080,407	1.8%
2031	2,134,249	2,117,923	0.8%
2032	2,150,321	2,154,391	-0.2%
2033	2,166,094	2,190,613	-1.1%
2034	2,181,570	2,228,095	-2.1%
2035	2,196,752	2,265,084	-3.0%
2036	2,210,350	2,304,446	-4.1%
2037	2,223,681	2,344,464	-5.2%
2038	2,236,748	2,383,338	-6.2%
Compound Annual Growth Rate			
2009 – 2018	3.6%	3.3%	---
2018 – 2023	3.2%	2.8%	---
2018 – 2028	2.0%	2.2%	---
2028 – 2038	0.7%	1.7%	---
2018 – 2038	1.4%	1.9%	---

NOTES: FAA – Federal Aviation Administration; TAF – Terminal Area Forecast

Enplaned passenger annual totals include air carrier and air taxi enplaned passengers.

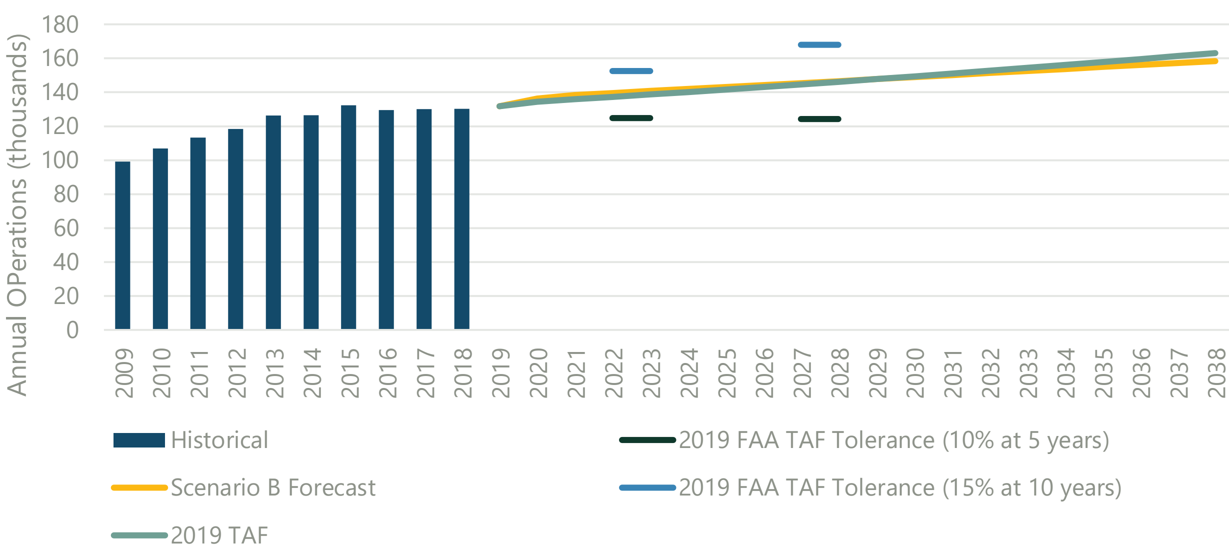
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical total enplaned passengers); Federal Aviation Administration, 2019 Terminal Area Forecast, February2020; Ricondo & Associates, Inc., September 2019 (forecast enplaned passengers).

EXHIBIT 3-5 SCENARIO B ENPLANED PASSENGER FORECAST COMPARISON



NOTES: FAA – Federal Aviation Administration; TAF – Terminal Area Forecast
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical total enplaned passengers); Federal Aviation Administration, 2019 Terminal Area Forecast, February 2020; Ricondo & Associates, Inc., August 2019 (forecast enplaned passengers).

EXHIBIT 3-6 SCENARIO B TOTAL AIRPORT OPERATIONS FORECAST COMPARISON



NOTES: FAA – Federal Aviation Administration; TAF – Terminal Area Forecast
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical operations); Federal Aviation Administration, 2019 Terminal Area Forecast, February 2020; Ricondo & Associates, Inc., September 2019 (forecast operations).

TABLE 3-25 SCENARIO B TOTAL AIRPORT OPERATIONS FORECAST COMPARISON

YEAR	HISTORICAL / SCENARIO B FORECAST	2019 FAA TAF	VARIANCE OF ACTUAL / FORECAST VERSUS TAF
Historical			
2009	99,171	97,441	1.8%
2010	106,815	113,781	-6.1%
2011	113,344	115,670	-2.0%
2012	118,431	115,475	2.6%
2013	126,302	123,882	2.0%
2014	126,577	126,089	0.4%
2015	132,398	133,178	-0.6%
2016	129,503	129,421	0.1%
2017	130,084	129,729	0.3%
2018	130,278	134,317	-3.0%
Forecast			
2019	131,871	131,702	0.1%
2020	136,261	134,447	1.3%
2021	138,474	135,885	1.9%
2022	139,607	137,312	1.7%
2023	140,742	138,719	1.5%
2024	141,880	140,130	1.2%
2025	143,020	141,580	1.0%
2026	144,198	143,077	0.8%
2027	145,378	144,578	0.6%
2028	146,561	146,144	0.3%
2029	147,746	147,749	0.0%
2030	148,935	149,378	-0.3%
2031	150,119	151,050	-0.6%
2032	151,306	152,716	-0.9%
2033	152,497	154,391	-1.2%
2034	153,693	156,097	-1.5%
2035	154,892	157,806	-1.8%
2036	156,075	159,561	-2.2%
2037	157,263	161,340	-2.5%
2038	158,454	163,113	-2.9%
Compound Annual Growth Rate			
2009 – 2018	3.1%	3.6%	---
2018 – 2023	1.6%	0.6%	---
2018 – 2028	1.2%	0.8%	---
2028 – 2038	0.8%	1.1%	---
2018 – 2038	1.0%	1.0%	---

NOTES: FAA – Federal Aviation Administration; TAF – Terminal Area Forecast

SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019 (historical operations); Federal Aviation Administration, 2019 Terminal Area Forecast, February 2020; Ricondo & Associates, Inc., September 2019 (forecast operations).

According to Boeing in its *World Air Cargo Forecast*, global e-commerce is projected to more than double over the next five years, growing from $1.7 trillion in 2016 to $3.6 trillion by 2020. The early translation is that the global air cargo tonnage increase of 8.5 percent in 2016 compared with 2015 was the strongest year for the market over the past five years, with the domestic US market growing by 9.3 percent and the international market growing by 5.4 percent. The influence on airports is significant. Many airports are struggling to keep pace with the expanding infrastructure and facility requirements that the cargo industry requires to accommodate record tonnage volumes.

To accommodate this growth, the logistics chain will have to become more efficient to keep up with increasing activity at all airports, but especially at those airports with limited acreage designated specifically for cargo activity.

3.6.2 LIHUE HISTORICAL AIR CARGO ACTIVITY

The last several years have experienced large year-over-year fluctuations in total cargo handled at LIH, which is largely due to the low overall tonnage totals. Overall cargo tonnage at the Airport has increased at a CAGR of 7.4 percent over the past 10 years (2009 to 2018). **Table 3-26** summarizes the past 10 years of historical air cargo activity at the Airport.

TABLE 3-26 HISTORICAL AIR CARGO TONNAGE

CARGO TONNAGE	HISTORICAL										CAGR
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009–2018
All-Cargo	11,072	12,794	11,691	12,632	13,907	14,550	16,078	19,293	20,162	19,772	6.7%
Passenger	1,334	1,592	1,620	1,981	1,562	1,642	2,116	2,732	3,427	3,752	12.2%
Total	12,406	14,386	13,311	14,613	15,469	16,192	18,194	22,025	23,589	23,524	7.4%
Annual Growth		**16.0%**	**-7.5%**	**9.8%**	**5.9%**	**4.7%**	**12.4%**	**21.1%**	**7.1%**	**-0.3%**	

NOTE: CAGR – Compound Annual Growth Rate
Passenger cargo tonnage volumes refer to belly cargo carried by passenger airlines
SOURCES: State of Hawaii, Department of Transportation – Airports Division, August 2019; US Department of Transportation, T-100 Database, August 2019; Ricondo & Associates, Inc., August 2019 (analysis).

The LIH cargo market is dominated by all-cargo airlines, which maintained between 84 and 90 percent market share over the past 10 years. As indicated in **Table 3-27**, which presents the historical cargo tonnage by airline, the top four airlines for air cargo tonnage are Aeko Kula (operated as Aloha Air Cargo), Trans Air, Hawaiian Airlines, and FedEx. These four airlines carried 96.9 percent of the Airport's cargo tonnage in CY 2018. Aloha Air Cargo accounted for 53.2 percent of all cargo tonnage carried in CY 2018.

TABLE 3-27 HISTORICAL AIR CARGO TONNAGE BY CARRIER

AIRLINE	HISTORICAL TONNAGE										CAGR
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009 –2018
Aeko Kula	10,153	10,282	9,860	10,586	10,805	11,203	12,667	14,696	15,138	12,507	2.3%
Trans Air	244	1,319	1,212	1,758	2,186	2,296	2,651	3,715	4,168	5,942	42.6%
Hawaiian Airlines	806	834	865	866	895	953	1,116	1,914	2,578	3,043	15.9%
FedEx	-	-	-	-	-	-	-	-	1,099	1,294	-
United Airlines	376	387	344	379	375	456	405	310	351	391	0.4%
Delta Air Lines	43	92	97	117	164	174	254	239	166	235	20.8%
Alaska Airlines	-	-	43	88	102	85	39	66	87	111	-
Kamaka Air	2	-	3	-	-	-	-	4	1	-	-
American Airlines	-	-	-	-	-	-	6	2	-	-	-
Corporate Air	783	810	739	818	942	1,026	1,057	1,078	-	-	-
Makani Kai	-	626	149	-	-	-	-	-	-	-	-
Grand Total	**12,406**	**14,350**	**13,311**	**14,613**	**15,469**	**16,192**	**18,194**	**22,025**	**23,589**	**23,524**	**7.4%**

NOTE: CAGR – Compound Annual Growth Rate
Table columns and rows may not add up to Airport and Airline totals due to rounding and CAGRs may differ from manual calculations due to rounding.
SOURCE: State of Hawaii, Department of Transportation – Airports Division, August 2019.

With its upcoming entry into the market, Southwest Airlines could take some share of the belly cargo carried by other passenger airlines. It remains to be seen how much cargo, if any, Southwest Airlines will carry on its interisland operations or to the US mainland.

3.6.3 CARGO ACTIVITY FORECAST

3.6.3.1 INDEPENDENT CARGO INDUSTRY FORECASTS

The latest independent forecasts prepared by aircraft manufacturers Airbus and Boeing, as noted in **Table 3-28** indicate long-term growth rates of 3.6 percent to 4.2 percent per year for the cargo industry worldwide, based primarily on anticipated underlying global economic growth. However, because the LIH cargo market is driven by other factors, such as its natural geography, these forecasts are only utilized as reference points.

TABLE 3-28 GLOBAL AIR CARGO FORECASTS

	FORECAST PERIOD	ANNUAL GROWTH RATE
Airbus	2019 – 2038	3.6%
Boeing	2018 – 2037	4.2%

SOURCES: Airbus, *Airbus Cargo Global Market Forecast 2019*, September 2019; Boeing, *Boeing World Air Cargo Forecast 2018*, October 2018.

3.6.3.2 FORECAST AIR CARGO

The development of the air cargo demand forecasts involved both quantitative analysis and professional judgment. Historical air cargo activity data were examined to identify past trends that will provide an indication of future activity levels. Methodologies employed for this forecast included both a socioeconomic regression analysis and a time series analysis. The regression analysis utilized the same independent variables as the Scenario A for enplaned passengers. In addition, a time series analysis was conducted utilizing recent trends in the air cargo market to predict future volumes of cargo tonnage.

As shown in **Table 3-29** and in **Exhibit 3-7**, the volume of air cargo at the Airport is forecast to increase from 23,524 tons in 2018 to between 34,113 and 39,479 tons in 2038, which represents approximately a 1.9 to 2.6 percent CAGR. Both forecasts are well below the most recent global cargo forecasts developed by Boeing and Airbus. Considering the US market is more mature than emerging and developing markets of the world, a more conservative growth forecast than the Airbus and Boeing forecasts is prudent for the Airport.

Comparing the CAGR's of the two forecasts to Hawaii's GRP CAGR, according to Woods & Poole Economics Inc., the time series forecast growth rate of 1.9 percent is more closely aligned with the projection for Hawaii's GRP of 1.8 percent over the same time period.

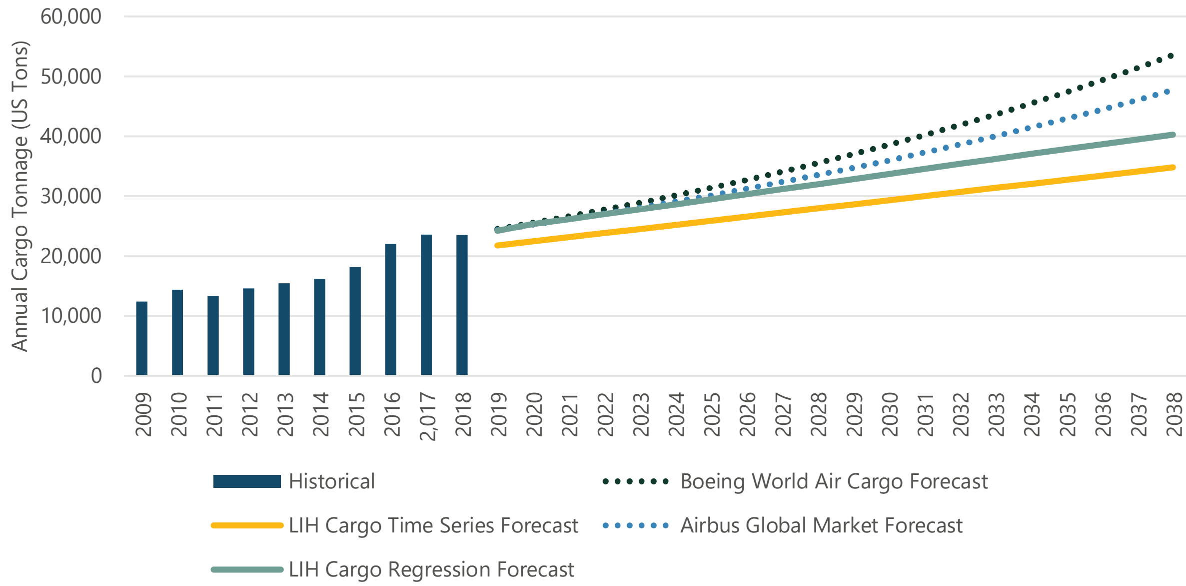
TABLE 3-29 FORECAST OF AIR CARGO ACTIVITY

YEAR	LIH CARGO TIME SERIES FORECAST	LIH CARGO REGRESSION FORECAST
Historical		
2009	12,406	12,406
2010	14,386	14,386
2011	13,311	13,311
2012	14,613	14,613
2013	15,469	15,469
2014	16,192	16,192
2015	18,194	18,194
2016	22,025	22,025
2017	23,589	23,589
2018	23,524	23,524
Forecast		
2019	21,770	24,235
2020	22,456	25,327
2021	23,141	26,146
2022	23,827	26,980
2023	24,513	27,795
2024	25,199	28,617
2025	25,884	29,448
2026	26,570	30,300
2027	27,256	31,153
2028	27,942	32,004
2029	28,627	32,855
2030	29,313	33,706
2031	29,999	34,552
2032	30,684	35,390
2033	31,370	36,221
2034	32,056	37,047
2035	32,742	37,867
2036	33,427	38,675
2037	34,113	39,479
2038	34,113	39,479
Compound Annual Growth Rate		
2009 – 2018	7.4%	7.4%
2018 – 2023	0.8%	3.4%
2018 – 2028	1.7%	3.1%
2028 – 2038	2.0%	2.1%
2018 – 2038	1.9%	2.6%

NOTE: CAGR – Compound Annual Growth Rate

SOURCES: State of Hawaii, Department of Transportation – Airports Division, September 2019, (historical activity); US Department of Transportation, T-100 Database, September 2019 (recent trends); Ricondo & Associates, Inc., September 2019 (forecast activity).

EXHIBIT 3-7 HISTORICAL AIR CARGO AND AIR CARGO FORECASTS



SOURCES: State of Hawaii, Department of Transportation – Airports Division, September 2019 (historical activity); US Department of Transportation, T-100 Database, September 2019 (recent trends); Airbus, *Airbus Cargo Global Market Forecast 2019*, September 2019; Boeing, *Boeing World Air Cargo Forecast 2018*, October 2018; Ricondo & Associates, Inc., September 2019 (forecast activity).

3.7 DESIGN DAY FLIGHT SCHEDULES

3.7.1 OVERVIEW

For purposes of assessing demand for future facility and operating requirements, design day flight schedules (DDFSs) of passenger airline and commercial aircraft operations activity at the Airport were developed. The design day represents activity throughout the hours of the selected peak month average weekday (PMAWD) at the Airport.

The following subsections describe the methodology and assumptions used in the development of the DDFSs, including the DDFSs for the base year (2018) and the future planning horizons of 2023, 2028, and 2038.

3.7.2 DESIGN DAY FLIGHT SCHEDULE DEVELOPMENT – PASSENGER AIRLINES

Each DDFS represents aircraft operations and passenger activity anticipated at the Airport during the PMAWD, and it provides information on aircraft arrival and departures times, aircraft type, arriving and departing passenger volumes specific to each flight, including O&D and connecting passengers, aircraft seating capacity, and load factors. The origin or destination airport, airline, and/or operator are also included in each DDFS.

3.7.3 DESIGN DAY FLIGHT SCHEDULE – BASE YEAR (2018)

To develop the passenger airline DDFS, the monthly passenger activity levels (scheduled seat capacity and operations) for 2018 were reviewed to determine the peak month at the Airport. Published data and Airport statistics identified July as the peak month for passenger aircraft operations and passenger volumes.

Published airline schedules for each day in July 2018 were reviewed, and it was determined that Monday, July 13, 2018, represented the PMAWD. Therefore, this day serves as the base schedule. Published airline schedules for this day provide the airline, aircraft type, number of seats, flight origin, flight destination, and flight times for each scheduled passenger airline operation.

Passenger volumes on each flight were calculated by applying flight-specific actual load factors from US DOT T-100 segment data to published schedules.[6] O&D and connecting passenger percentages were applied to indicate the passenger types onboard each flight.[7]

3.7.4 DESIGN DAY FLIGHT SCHEDULE – FUTURE YEARS (2023, 2028, AND 2038)

Future year DDFSs were informed by the Scenario B activity forecasts presented earlier in this section. Other assumptions used in the development of DDFSs include the following:

- The base year PMAWD to annual ratio of passengers and operations remains stable over the planning horizon.
- Potential new nonstop service was identified based on forecast O&D passenger levels in future years. Base year domestic O&D passengers were compiled by market and forecast for future years using annual forecast growth rates. Passenger level thresholds were developed by multiplying an average aircraft seat capacity, load factor, and number of daily operations to identify a level of service that potential new markets could support (i.e., 150 seats, 80 percent load factor, 2 daily departures, 365 days a year). Potential new markets were identified when forecast O&D passenger volumes surpassed the threshold. New destinations and increased service to existing destinations were assumed to be served by current and new airlines operating at the Airport.

The base year DDFS was used in the successive development of the 2023, 2028, and 2038 DDFSs. Future load factors and seat capacity were determined through an iterative process that simulated an individual airline's changes in flight frequency and aircraft size in response to forecast growth. The following steps describe the airline schedule development process:

- Forecast passenger and aircraft operation growth rates were applied to the base year schedule to establish "targets" of passenger and aircraft operations levels for each of the future DDFSs. These targets provided guidance by maintaining forecast market share, and they identified the number of additional aircraft operations expected in each of the future DDFSs.
- Forecast passenger growth rates from 2018 to 2023 were applied to the base schedule on a route-by-route basis. This was followed by a test calculation (run on a route-by-route basis) to determine if forecast 2023 passenger levels could be accommodated on base year aircraft seat capacity (i.e., whether the load factor was below 100 percent). If the load factor was greater than the flight-specific threshold (approximately 95 percent), then the base year aircraft was either (1) increased in aircraft size, (2) unchanged and a new flight added, and/or (3) unchanged if the load factor was below 100 percent to meet forecast operations and anticipated fleet mix targets. If the forecast passenger growth rate resulted in reasonable load factors, then the aircraft assigned in the schedule remained unchanged.
- In some cases, professional judgment was used to determine whether an increase in gauge and/or a new flight(s) was added to an airline-market combination. These decisions were primarily based on whether (1) the airline fleet consists of, or the airline has on order for, the necessary size of aircraft for the applicable DDFS period; (2) a larger gauge aircraft is available that could reasonably and effectively operate in the market; and (3) a new flight addition would be consistent with forecast increases in aircraft operations and the anticipated fleet mix.

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6 US Department of Transportation, Air Carrier Statistics Database (T100), September 2019.

7 US Department of Transportation, Airline Origin and Destination Survey (D1B1), September 2019

- If an additional flight(s) was added to an existing market, then passengers were redistributed across all flights in that airline-market combination. Flights added to the DDFS were matched with new flight arrivals/departures and were based on typical aircraft turnaround times for the specific airline and fleet types serving the Airport. If applicable, new flights were assumed to return to their origins/destinations rather than "flowing through" to other origins and destinations. Arrival and departure times for new flights to existing markets were established considering flight times currently scheduled by the specific airline, estimates of times airline travelers would typically want to arrive at and depart from the Airport, and the timing of connecting opportunities at destination hubs.
- Once the 2023 DDFS was completed, the process was repeated for the 2028 and 2038 DDFSs.

It was assumed that aircraft gauge would not decrease in future years, unless (1) no larger gauge aircraft was available in the fleet and (2) the new additional flight in the airline-market combination resulted in unreasonably low load factors for the combination.

3.7.5 DESIGN DAY FLIGHT SCHEDULE SUMMARY – PASSENGER AIRLINES

Table 3-30 present a summary of the DDFS results for the Airport for the base year of 2018 and for each planning year.

TABLE 3-30 DESIGN DAY FLIGHT SCHEDULE SUMMARY – AIRPORT TOTAL

	TOTAL				
FISCAL YEAR	PASSENGERS	SEATS	LOAD FACTOR	AVERAGE SEATS	OPERATIONS
BASE (2018)	12,807	12,807	80.9%	152.3	104
PAL1 (2023)	17,280	13,113	75.9%	154.3	112
PAL2 (2028)	18,204	13,678	75.1%	159.7	114
PAL3 (2038)	19,110	14,657	76.7%	161.9	118
CAGR					
2018 – 2038	0.7%	0.9%		0.3%	0.6%

NOTES: CAGR – Compound Annual Growth Rate; PAL – Planning Activity Level
SOURCES: Innovata, July 2018 (schedule data); US Department of Transportation, T-100 Database, July 2018; Ricondo & Associates, Inc., September 2019.

Results and statistics for the base (2018), 2023, 2028, and 2038 schedules are shown in **Table 3-31** through **Table 3-33** and on **Exhibit 3-8** through **Exhibit 3-11**.

As noted, the DDFS development was based on the Scenario B forecast of enplaned passengers and aircraft operations.

The following summarizes the Airport's total results:

- Total passengers are forecast to increase from approximately 12,807 (base) to approximately 19,110 (2038), representing a CAGR of 0.7 percent during this period.
- Total seats are forecast to increase faster than passengers at a CAGR of 0.9 percent over the forecast period, resulting in total load factor at the Airport decreasing slightly from 80.9 percent (base) to 76.7 percent (2038).
- Total passenger airline operations are forecast to increase slightly from 104 (base) to 118 (2038), representing a CAGR of 0.6 percent during the forecast period.
- Average seats per operation is forecast to increase from 152.3 seats (base) to 161.9 seats (2038), representing a CAGR of 0.3 percent.

TABLE 3-31 DESIGN DAY ARRIVAL AND DEPARTURE SUMMARY

YEAR	ARRIVALS					DEPARTURES					TOTAL				
	PASSENGERS	SEATS	LOAD FACTOR	AVERAGE SEATS	OPERATIONS	PASSENGERS	SEATS	LOAD FACTOR	AVERAGE SEATS	OPERATIONS	PASSENGERS	SEATS	LOAD FACTOR	AVERAGE SEATS	OPERATIONS
All Passengers															
2018	6,467	7,918	81.7%	152.3	52	6,340	7,918	80.1%	152.3	52	12,807	15,836	80.9%	152.3	104
2023	6,624	8,640	76.7%	154.3	56	6,489	8,640	75.1%	154.3	56	13,113	17,280	75.9%	154.3	112
2028	6,907	9,102	75.9%	159.7	57	6,770	9,102	74.4%	159.7	57	13,678	18,204	75.1%	159.7	114
2038	7,397	9,555	77.4%	161.9	59	7,260	9,555	76.0%	161.9	59	14,657	19,110	76.7%	161.9	118
Compound Annual Growth Rate															
2018 – 2023	0.5%	1.8%	---	0.3%	1.5%	0.5%	1.8%	---	0.3%	1.5%	0.5%	1.8%	---	0.3%	1.5%
2023 – 2028	0.8%	1.0%	---	0.7%	0.4%	0.9%	1.0%	---	0.7%	0.4%	0.8%	1.0%	---	0.7%	0.4%
2028 – 2038	0.7%	0.5%	---	0.1%	0.3%	0.7%	0.5%	---	0.1%	0.3%	0.7%	0.5%	---	0.1%	0.3%
2018 – 2038	0.7%	0.9%	---	0.3%	0.6%	0.7%	0.9%	---	0.3%	0.6%	0.7%	0.9%	---	0.3%	0.6%
Domestic															
2018	6,203	7,575	81.9%	151.5	50	6,166	7,575	81.4%	151.5	50	12,368	15,150	81.6%	151.5	100
2023	6,327	8,297	76.3%	153.6	54	6,293	8,297	75.8%	153.6	54	12,619	16,594	76.0%	153.6	108
2028	6,609	8,759	75.5%	159.3	55	6,574	8,759	75.1%	159.3	55	13,183	16,594	79.4%	153.6	108
2038	7,104	9,212	77.1%	161.6	57	7,066	9,212	76.7%	161.6	57	14,171	17,518	80.9%	159.3	110
Compound Annual Growth Rate															
2018 – 2023	0.4%	1.8%	---	0.3%	1.6%	0.4%	1.8%	---	0.3%	1.6%	0.4%	1.8%	---	0.3%	1.6%
2023 – 2028	0.9%	1.1%	---	0.7%	0.4%	0.9%	1.1%	---	0.7%	0.4%	0.9%	0.0%	---	0.0%	0.0%
2028 – 2038	0.7%	0.5%	---	0.1%	0.4%	0.7%	0.5%	---	0.1%	0.4%	0.7%	0.5%	---	0.4%	0.2%
2018 – 2038	0.7%	1.0%	---	0.3%	0.7%	0.7%	1.0%	---	0.3%	0.7%	0.7%	0.7%	---	0.3%	0.5%
International and Preclearance															
2018	264	343	77.0%	171.5	2	174	343	50.8%	171.5	2	439	686	63.9%	171.5	4
2023	298	343	86.7%	171.5	2	196	343	57.3%	171.5	2	494	686	72.0%	171.5	4
2028	298	343	86.9%	171.5	2	197	343	57.4%	171.5	2	494	686	72.0%	171.5	4
2038	293	343	85.4%	171.5	2	193	343	56.4%	171.5	2	495	686	72.1%	171.5	4
Compound Annual Growth Rate															
2018 – 2023	2.5%	0.0%	---	0.0%	0.0%	2.4%	0.0%	---	0.0%	0.0%	2.4%	0.0%	---	0.0%	0.0%
2023 – 2028	0.0%	0.0%	---	0.0%	0.0%	0.1%	0.0%	---	0.0%	0.0%	0.0%	0.0%	---	0.0%	0.0%
2028 – 2038	-0.2%	0.0%	---	0.0%	0.0%	-0.2%	0.0%	---	0.0%	0.0%	0.0%	0.0%	---	0.0%	0.0%
2018 – 2038	0.5%	0.0%	---	0.0%	0.0%	0.5%	0.0%	---	0.0%	0.0%	0.6%	0.0%	---	0.0%	0.0%

SOURCES: Innovata, July 2018 (scheduled flights); US Department of Transportation, T-100 and DB1B Databases, July 2018 (load factor, origin and destination passengers); Ricondo & Associates, Inc., September 2019 (design day activity).

TABLE 3-32 DESIGN DAY FLIGHT SCHEDULE PEAK-HOUR PASSENGER VOLUMES – 2018, 2023, 2028, AND 2038

	2018			2023			2028			2038		
TIME OF DAY (HOURLY)	DEPLANED	ENPLANED	TOTAL	DEPLANED	ENPLANED	TOTAL	DEPLANED	ENPLANED	TOTAL	DEPLANED	ENPLANED	TOTAL
0:00 – 0:59	0	0	0	0	0	0	0	0	0	0	0	0
1:00 – 1:59	0	0	0	0	0	0	0	0	0	0	0	0
2:00 – 2:59	0	0	0	0	0	0	0	0	0	0	0	0
3:00 – 3:59	0	0	0	0	0	0	0	0	0	0	0	0
4:00 – 4:59	0	0	0	0	0	0	0	0	0	0	0	0
5:00 – 5:59	93	0	93	89	0	89	87	0	87	94	0	94
6:00 – 6:59	93	96	188	89	92	181	87	90	177	94	91	185
7:00 – 7:59	93	96	188	89	92	181	87	90	177	94	91	185
8:00 – 8:59	185	360	545	178	322	501	175	323	498	188	311	498
9:00 – 9:59	93	96	188	89	92	181	87	90	177	94	91	185
10:00 –10:59	570	210	780	511	202	713	515	197	713	554	200	754
11:00 – 11:59	887	593	1,480	978	531	1,510	994	536	1,531	1,069	534	1,603
12:00 – 12:59	511	459	970	605	580	1,185	834	585	1,419	896	600	1,497
13:00 – 13:59	370	775	1,145	698	870	1,568	702	1,112	1,814	754	1,145	1,899
14:00 – 14:59	671	276	947	631	581	1,212	647	594	1,241	695	572	1,267
15:00 – 15:59	451	516	967	437	497	934	437	487	924	470	492	962
16:00 – 16:59	204	424	628	196	412	608	192	411	603	206	424	631
17:00 – 17:59	362	191	553	323	184	507	325	180	505	349	182	531
18:00 – 18:59	334	287	621	325	276	601	327	270	597	352	273	625
19:00 – 19:59	269	405	675	191	369	560	194	379	573	208	378	586
20:00 – 20:59	542	237	779	516	231	746	533	235	768	573	397	970
21:00 – 21:59	382	553	935	291	468	759	298	483	781	320	524	844
22:00 – 22:59	357	593	950	387	494	881	385	510	895	387	543	929
23:00 – 23:59	0	174	174	0	196	196	0	197	197	0	411	411
Total	**6,467**	**6,340**	**12,807**	**6,624**	**6,489**	**13,113**	**6,907**	**6,770**	**13,678**	**7,397**	**7,260**	**14,657**
Peak Block Hour	887	775	1,480	978	870	1,568	994	1,112	1,814	1,069	1,145	1,899
Peak Rolling Hour (10-minute intervals)	980	919	1,655	1,067	994	1,656	1,082	1,242	1,866	1,163	1,285	1,956

NOTE: Table columns and rows may not add up to Airport and Airline totals due to rounding.
SOURCES: Innovata, July 2018 (scheduled flights); US Department of Transportation, T-100 and DB1B Databases, July 2018 (load factor, origin and destination passengers); Ricondo & Associates, Inc., September 2019 (design day activity).

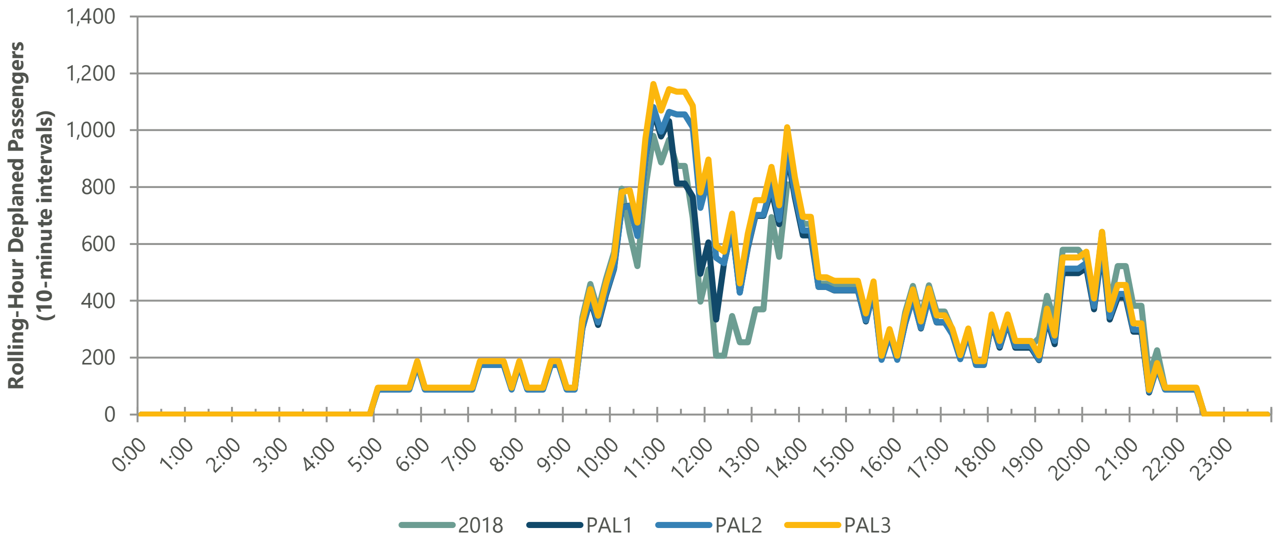
TABLE 3-33 DESIGN DAY FLIGHT SCHEDULE PEAK-HOUR PASSENGER AIRLINE AIRCRAFT OPERATIONS – 2018, 2023, 2028, AND 2038

TIME OF DAY (HOURLY)	2018			2023			2028			2038		
	ARRIVALS	DEPARTURES	TOTAL	ARRIVALS	DEPARTURES	TOTAL	ARRIVALS	DEPARTURES	TOTAL	ARRIVALS	DEPARTURES	TOTAL
0:00 – 0:59	0	0	0	0	0	0	0	0	0	0	0	0
1:00 – 1:59	0	0	0	0	0	0	0	0	0	0	0	0
2:00 – 2:59	0	0	0	0	0	0	0	0	0	0	0	0
3:00 – 3:59	0	0	0	0	0	0	0	0	0	0	0	0
4:00 – 4:59	0	0	0	0	0	0	0	0	0	0	0	0
5:00 – 5:59	1	0	1	1	0	1	1	0	1	1	0	1
6:00 – 6:59	1	1	2	1	1	2	1	1	2	1	1	2
7:00 – 7:59	1	1	2	1	1	2	1	1	2	1	1	2
8:00 – 8:59	2	2	4	2	2	4	2	2	4	2	2	4
9:00 – 9:59	1	1	2	1	1	2	1	1	2	1	1	2
10:00 –10:59	3	2	5	3	2	5	3	2	5	3	2	5
11:00 – 11:59	3	3	6	3	3	6	3	3	6	3	3	6
12:00 – 12:59	2	2	4	2	2	4	3	2	5	3	2	5
13:00 – 13:59	1	2	3	2	2	4	2	3	5	2	3	5
14:00 – 14:59	2	0	2	2	1	3	2	1	3	2	1	3
15:00 – 15:59	3	4	7	3	4	7	3	4	7	3	4	7
16:00 – 16:59	2	3	5	2	3	5	2	3	5	2	3	5
17:00 – 17:59	2	2	4	2	2	4	2	2	4	2	2	4
18:00 – 18:59	2	3	5	2	3	5	2	3	5	2	3	5
19:00 – 19:59	1	1	2	1	1	2	1	1	2	1	1	2
20:00 – 20:59	1	1	2	1	1	2	1	1	2	1	1	2
21:00 – 21:59	1	1	2	1	1	2	1	1	2	1	1	2
22:00 – 22:59	1	1	2	1	1	2	1	1	2	2	1	3
23:00 – 23:59	0	0	0	0	0	0	0	0	0	0	1	1
Total	**30**	**30**	**60**	**31**	**31**	**62**	**32**	**32**	**64**	**33**	**33**	**66**
Peak Block Hour	3	4	7	3	4	7	3	4	7	3	4	7
Peak Rolling Hour (10-minute intervals)	5	4	8	5	4	8	5	4	8	5	4	8

NOTE: Table columns and rows may not add up to Airport and Airline totals due to rounding.

SOURCES: Innovata, July 2018 (scheduled flights); US Department of Transportation, T-100 and DB1B Databases, July 2018 (load factor, origin and destination passengers); Ricondo & Associates, Inc., September 2019 (design day activity).

EXHIBIT 3-8 ROLLING-HOUR DEPLANED PASSENGERS – AIRPORT

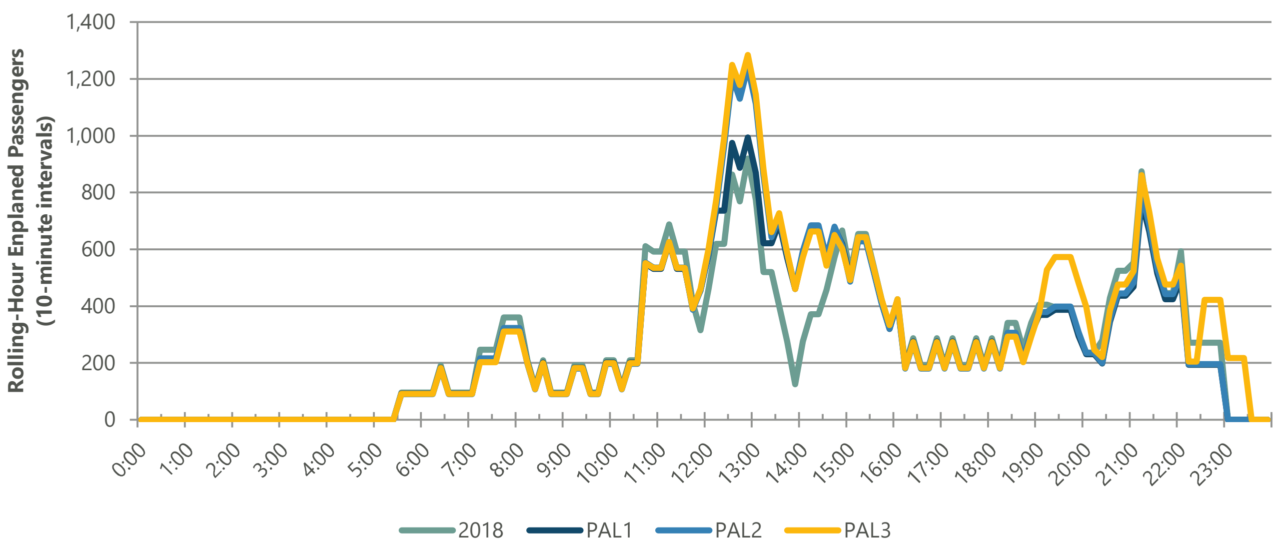


NOTES: PAL – Planning Activity Level

PAL 1 = 2023, PAL 2 = 2028, and PAL 3 = 2038

SOURCES: Innovata, July 2018 (scheduled flights); US Department of Transportation, T-100 and DB1B Databases, July 2018 (load factor, origin and destination passengers); Ricondo & Associates, Inc., September 2019 (design day activity).

EXHIBIT 3-9 ROLLING-HOUR ENPLANED PASSENGERS – AIRPORT

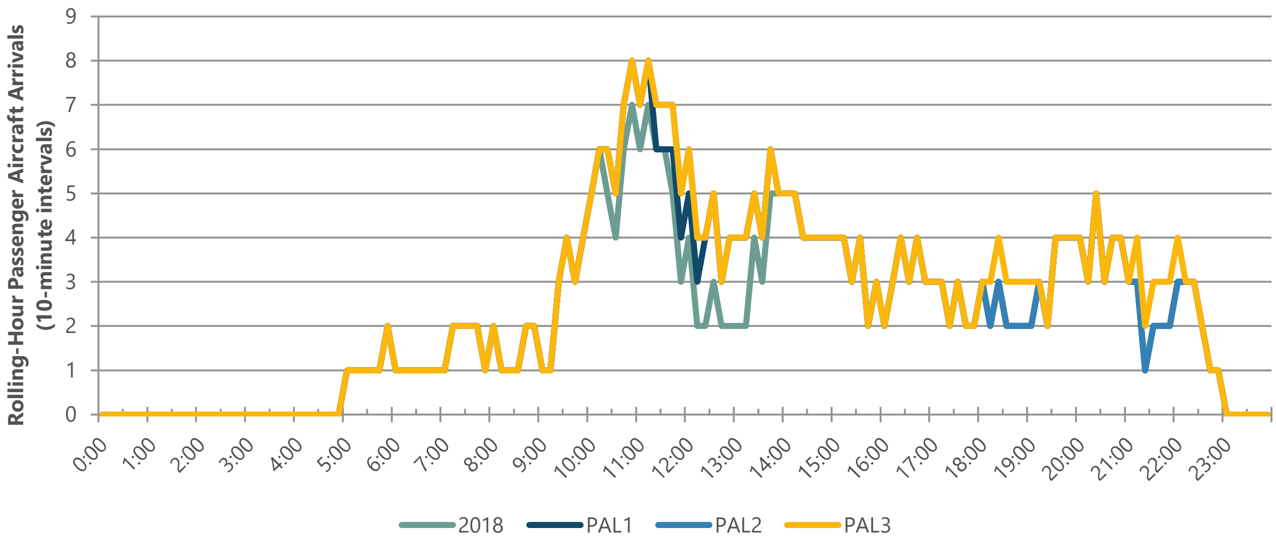


NOTES: PAL – Planning Activity Level

PAL 1 = 2023, PAL 2 = 2028, and PAL 3 = 2038

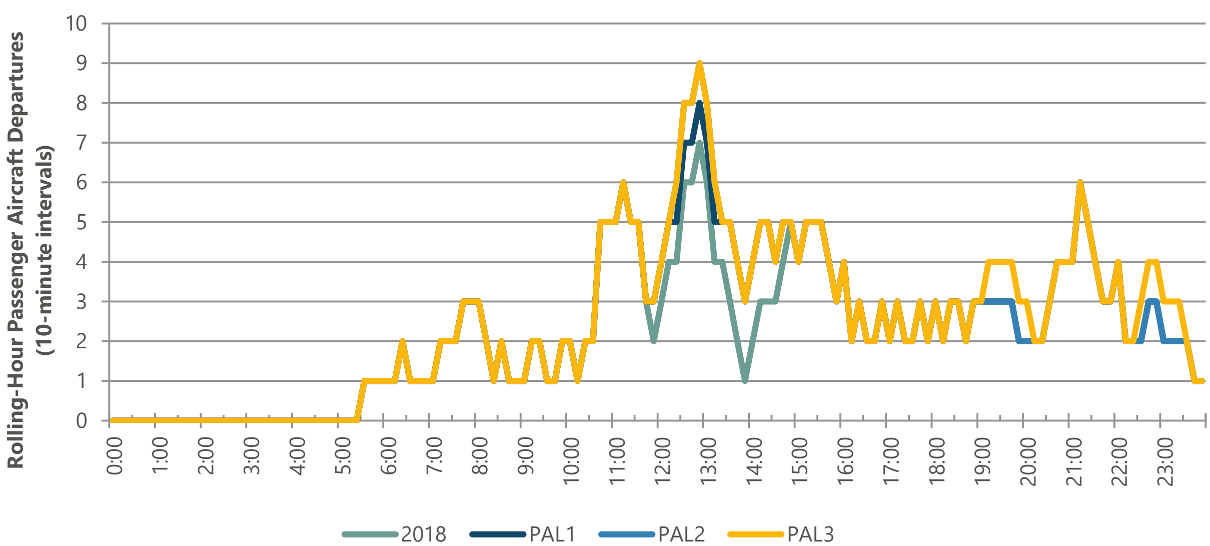
SOURCES: Innovata, July 2018 (scheduled flights); US Department of Transportation, T-100 and DB1B Databases, July 2018 (load factor, origin and destination passengers); Ricondo & Associates, Inc., September 2019 (design day activity).

EXHIBIT 3-10 ROLLING-HOUR PASSENGER AIRLINE AIRCRAFT ARRIVAL OPERATIONS – AIRPORT



NOTES: PAL – Planning Activity Level
PAL 1 = 2023, PAL 2 = 2028, and PAL 3 = 2038
SOURCES: Innovata, July 2018 (scheduled flights); US Department of Transportation, T-100 and DB1B Databases, July 2018 (load factor, origin and destination passengers); Ricondo & Associates, Inc., September 2019 (design day activity).

EXHIBIT 3-11 ROLLING-HOUR PASSENGER AIRLINE AIRCRAFT DEPARTURE OPERATIONS – AIRPORT



NOTES: PAL – Planning Activity Level
PAL 1 = 2023, PAL 2 = 2028, and PAL 3 = 2038
SOURCES: Innovata, July 2018 (scheduled flights); US Department of Transportation, T-100 and DB1B Databases, July 2018 (load factor, origin and destination passengers); Ricondo & Associates, Inc., September 2019 (design day activity).

APPENDIX C

Consultation – Support Documents

C.1 | TECHNICAL ADVISORY COMMITTEE MEMBERS FOR THE NOISE EXPOSURE MAP UPDATE

C.2 | TECHNICAL ADVISORY COMMITTEE MEETING #1 PRESENTATION

C.3 | TECHNICAL ADVISORY COMMITTEE MEETING #2 PRESENTATION

APPENDIX C.1

Technical Advisory Committee Members for the Noise Exposure Map Update

APPENDIX C CONSULTATION – SUPPORT DOCUMENTS

C.1 TECHNICAL ADVISORY COMMITTEE MEMBERS FOR THE NOISE EXPOSURE MAP UPDATE

TABLE C.1-1 TECHNICAL ADVISORY COMMITTEE MEMBERS FOR THE NOISE EXPOSURE MAP UPDATE

NAME	TITLE	REPRESENTING [1]
Brian Schatz	US Senator	US Senate
Mazie Hirono	US Senator	US Senate
Kai Kahele	District 2 US Representative	US Congress
Harold Taira	Port Director	US Department of Agriculture
Dee Morikawa	District 16 State Representative	State of Hawaii
James Tokioka	District 15 State Representative	State of Hawaii
Nadine K. Nakamura	District 14 State Representative	State of Hawaii
Ronald D. Kouchi	President, Hawaii State Senate	State of Hawaii
Roth Puahala	Assistant to Senator Ronald D. Kouchi	State of Hawaii
Wesley T. Matsunaga	District Land Agent	Department of Land and Natural Resources
Arryl Kaneshiro	Council Chair	County of Kauai
Don Kakuda	Unknown	County of Kauai, Wastewater Division
Jason Kagimoto	Unknown	County of Kauai, Public Works Department
Kaaina Hull	Director	County of Kauai, Planning Department
Lea Kaiaokamalie	Senior Planner and Geographic Information System Analyst	County of Kauai, Planning Department
Mark Perriello	President/CEO	Kauai Chamber of Commerce
Gordon Wong	Program Manager	Federal Aviation Administration
Kimberly Evans	Community Planner	Federal Aviation Administration
Rod Kitchel	Air Traffic Manager	Lihue Federal Contract Tower, Hawaii
Amy St. Pierre	Manager	Lihue Federal Contract Tower, Hawaii
Sue Kanoho	Executive Director	Kauai Visitors Bureau
Bonita A. Saffold	Real Estate Agent	FedEx Express
Dale Nelson	Unknown	FedEx Feeder Ops – Corporate Air
Tony Ind	Unknown	FedEx
James Mertens	Duty Manager	Airlines Committee of Hawaii/AvAirPros
Dee Miranda	Unknown	Airborne Aviation Hawaii
Kiku Kobo	Unknown	Airborne Aviation Hawaii
Ingrid Wehner	Operations Manager	Aloha Helicopters
Linda Bukoski	Unknown	Island Helicopters
Casey Riemer	Manager	Jack Harter Helicopters
Chantelle Carverio	Unknown	Mauna Loa Helicopters
Kyle Jacobson	Unknown	Safari Helicopters
Dennis Fujimoto	General Public	The Garden Island
Jan TenBruggencate	General Public	Island Strategy

NOTE:

1 Title 14 Code of Federal Regulations Part 150 requires consultation with states, and public agencies and planning agencies whose area, or any portion of whose area, of jurisdiction is within the day-night average sound level (DNL) 65 A-weighted decibels (dBA) contour depicted on the Noise Exposure Map (NEM), Federal Aviation Administration (FAA) regional officials, and other federal officials having local responsibility for land uses depicted on the map. The airport proprietor shall identify each public agency and planning agency whose jurisdiction or responsibility is either wholly or partially within the DNL 65 dBA boundary and supporting documentation shall identify their geographic areas of jurisdiction. The planning agencies highlighted in gray in this table have jurisdiction, and their boundaries are depicted on the NEMs.

SOURCE: Ricondo & Associates, Inc., November 2021.

APPENDIX C.2

Technical Advisory Committee Meeting #1 Presentation

Lihue Airport Noise Exposure Map Update

Technical Advisory Committee Meeting #1

October 25, 2021

Welcome

- DOT-A Welcome and Consultant Team introduction
- Online Participants Roll Call by Consultant Team
- COVID-19 Pandemic impacts
- Relationship to the Master Plan Study

Project Team

- State of Hawaii Department of Transportation – Airports Division (DOT-A)
  - Sponsor of the Part 150 Noise Exposure Map (NEM) Update Study
  - State Project Manager: Mr. Raymond Severn

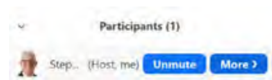
- Consultant Team
  - Ricondo & Associates, Inc. leading the Part 150 NEM Update Study
  - 30+ years of airport planning and operations and aircraft noise analysis experience
  - Project Principal: Mr. John Williams

Zoom Protocol

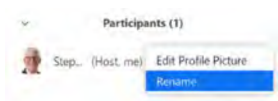
- Welcome
  - Update your Name
    1. First and Last Name
    2. Abbreviated Organization Name
    3. Ex: Raymond Severn - DOT-A
  - Names to be used to identify Technical Advisory Members

1. At the bottom of the screen in Zoom, click on the "Participants" icon.

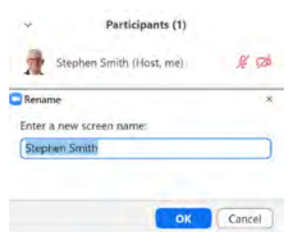
2. A list of participants will appear on the right-hand side of the Zoom room. Hover over your name and click the "More" button.



3. Click the "Rename" option



4. Enter your name beginning with the name of your organization in the "Enter a new screen name" field. If available on the screen, make sure to uncheck "Remember my name for future meetings" if you wish not to carry the changes forward for future Zoom meetings.



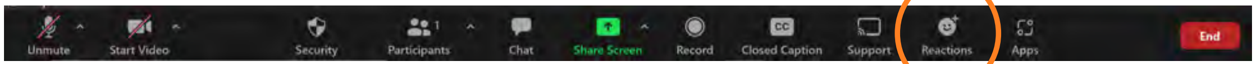
Note: some users may have a different version of Zoom with different locations of commands, but the participant symbology should be the same.

Zoom Protocol

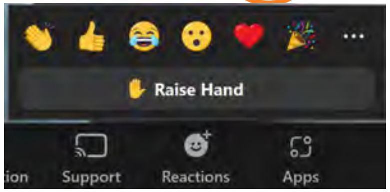
- Commenting
  - All participants will be muted by the moderator
  - Moderator will call on participants who:

1. Raise hand physically (if video is on)
2. Raise hand virtually (hand feature)

Hand feature: select “Reactions” icon then



Select “Raise Hand” button



3. Comment in chat

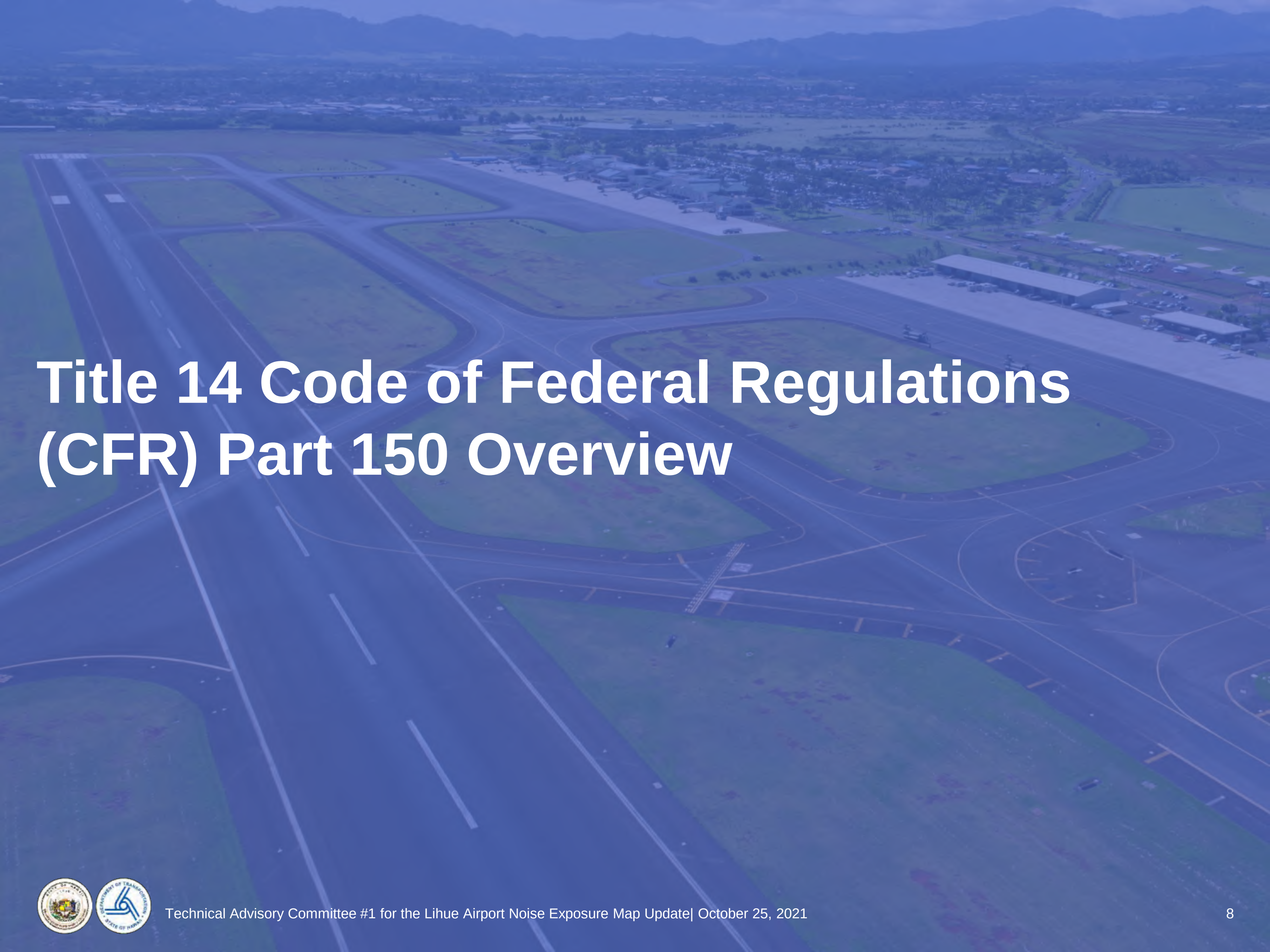
4. Send an email to uyvan@ricondo.com (if none of these features work and you are a committee member with a question or comment)

Agenda

1. Title 14 CFR Part 150 Overview
2. Roles in NEM Update
3. Understanding Noise and Sound Level Metrics
4. Operations Forecast and Study Years
5. Noise Modeling Methodology and Inputs
6. Land Use Compatibility
7. Public Involvement Plan
8. Next Steps
9. Q&A Session

Objectives of TAC Meeting

1. Understand Title 14 CFR Part 150 process
2. Confirm application of Master Plan forecast is appropriate
3. Confirm the study years are appropriate
4. Understand aircraft noise methodology
5. Confirm the 2019 operations reasonably reflect existing average annual day conditions
6. Understand the 2027 forecast average annual day operation conditions
7. Confirm land use data and compatibility guidelines
8. Understand planned public review and input program



Title 14 Code of Federal Regulations (CFR) Part 150 Overview

Title 14 CFR Part 150 Overview

- Sets forth the regulations and guidelines for airport sponsors to undertake noise compatibility planning

- Establishes the methodology for preparing aircraft noise exposure maps and developing aircraft noise and land use compatibility programs

- 14 CFR Part 150 studies are voluntary and must abide by 14 CFR Part 150 guidelines to be accepted by FAA

Title 14 CFR Part 150 Overview – History

- Promulgated by the FAA pursuant to the Aviation Safety and Noise Abatement Act (ASNA) of 1979, Public Law 96-193

- In 1981, an Interim Rule on Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning* was issued

- FAR Part 150 finalized in 1985

- Recodified as Title 14 Code of Federal Regulations (CFR) Part 150

- Part 150 studies must adhere to 14 CFR Part 150 guidelines for noise exposure maps to be accepted, and noise compatibility programs to be approved by FAA

Title 14 CFR Part 150 Overview – Parts

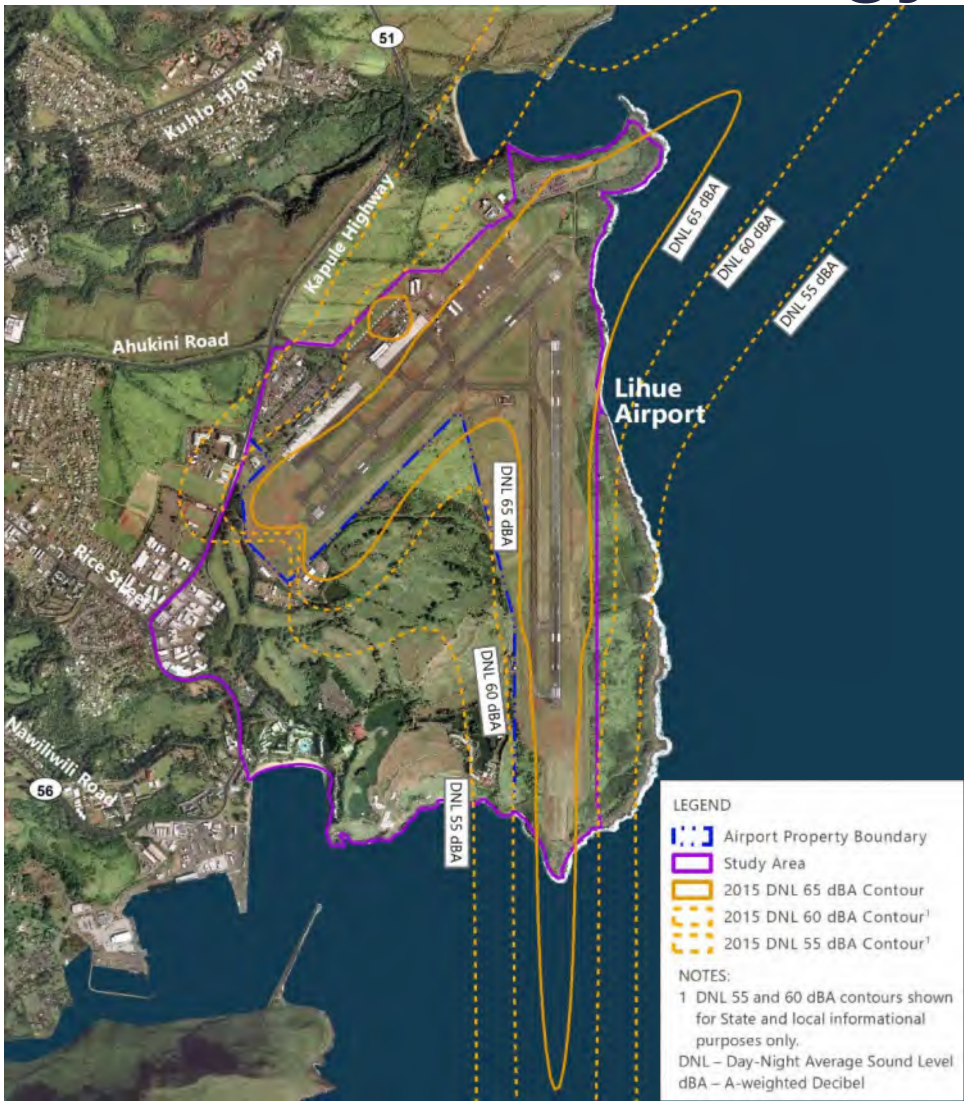
- A Title 14 CFR Part 150 Study identifies and evaluates two components – existing and future:
  - aircraft noise
  - land use

- Consists of two distinct but complementary portions:
  - Noise Exposure Maps (NEM)
  - Noise Compatibility Program (NCP)

- The Lihue Airport Title 14 CFR Part 150 NEM Update:
  - **Will** update existing and future aircraft noise and
  - **Will** reflect existing and future land use conditions
  - **Will not** update the Noise Compatibility Program

Title 14 CFR 150 Overview - Terminology

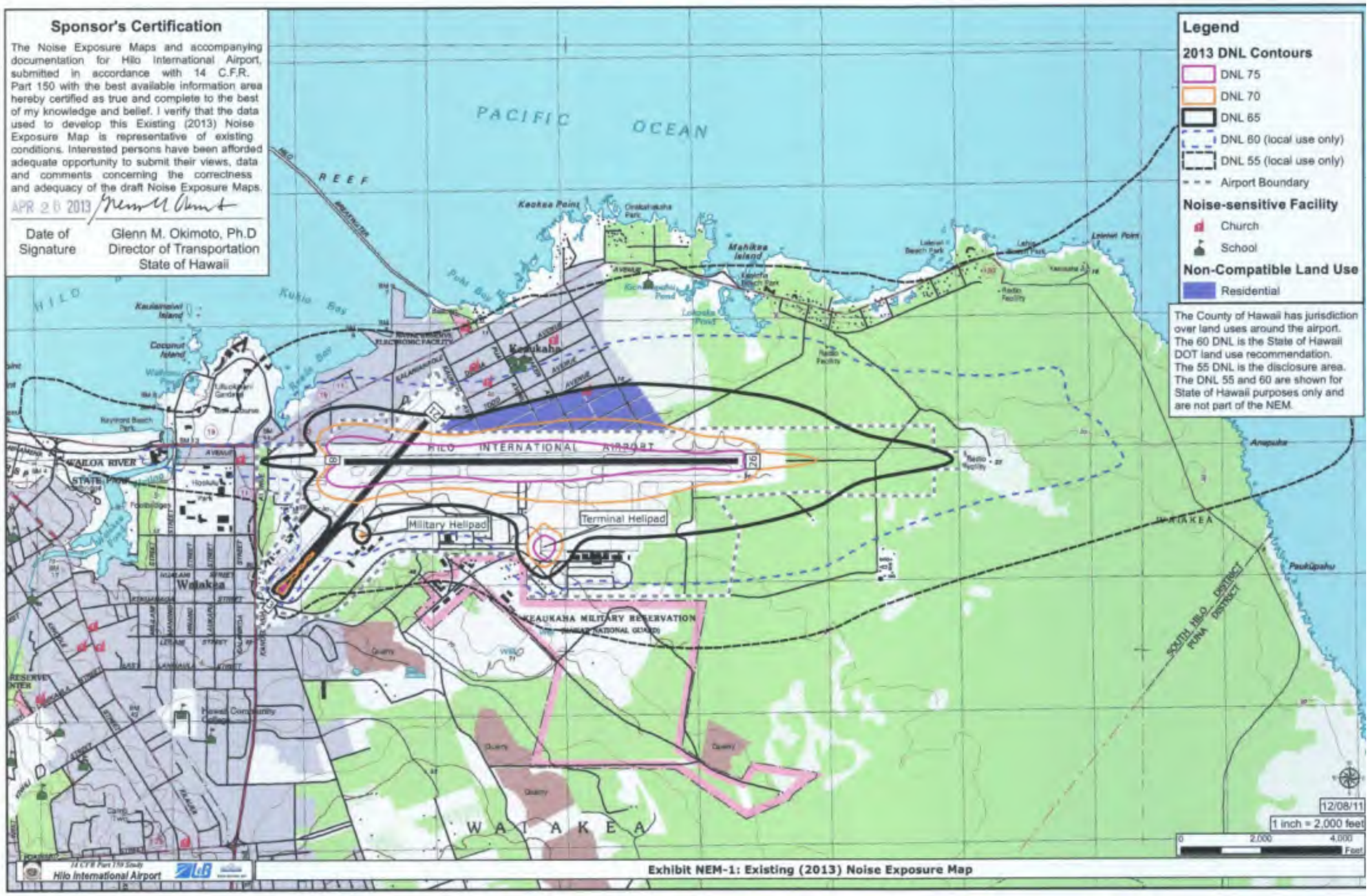
<u>Aircraft Noise Contour (contour):</u>
Lines connecting points of equal noise exposure level



SOURCE: Ricondo & Associates, Inc., *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final Environmental Assessment,* March 2018.

Title 14 CFR 150 Overview - Terminology

Noise Exposure Map (NEM) - Provides information on the existing and future expected areas exposed to various levels of aircraft noise around an airport.



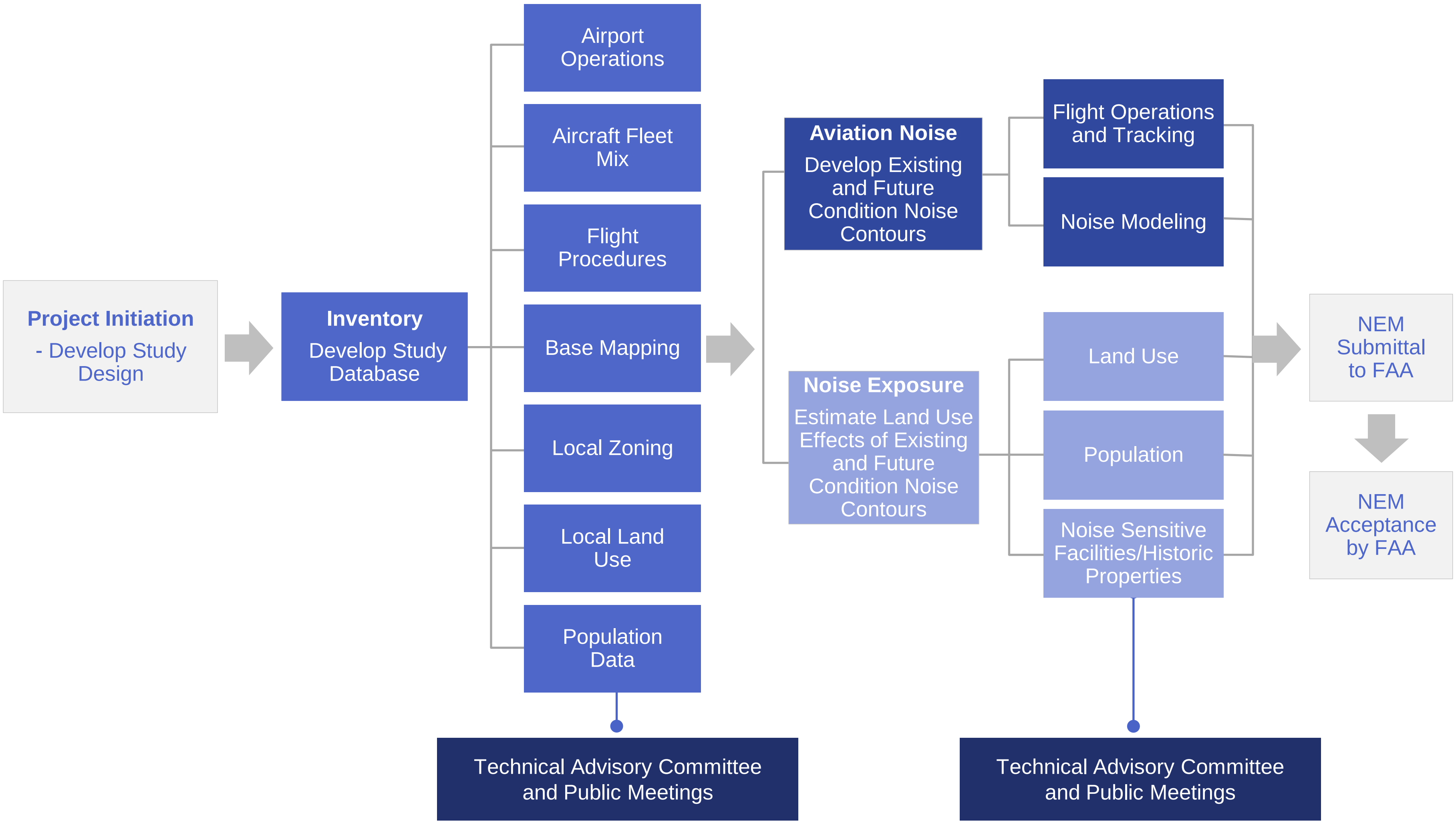
SOURCE: Hawaii Department of Transportation - Airports Division, *Hilo International Airport: FAR Part 150 Noise Exposure Map Update,* April 2013.

Title 14 CFR 150 Overview – NEM Update

- Determine existing and future noise conditions in the vicinity of the Airport due to changes since previous FAA-accepted NEM in:
  - Operations
  - Aircraft used by operators
  - Airfield (i.e., LIH Runway 3-21 runway safety area improvements)
  - Incompatible land use

- Method:
  - Conduct an update to the Noise Exposure Maps (NEMs) for existing and future conditions
  - Consult stakeholders and provide general public opportunity to comment on update

Title 14 CFR Part 150 Overview – NEM Process



SOURCE: Ricondo & Associates, Inc., October 2021.

Title 14 CFR Part 150 Overview – Regulatory Framework

- **Federal law** establishes aircraft noise standards, operating rules, compatibility planning process, and limitations on the airport owner's capability to restrict aircraft operations.

- **State law** establishes compatibility planning guidelines and noise standards except for aircraft.

- **Local noise ordinances** establishes noise standards and compatible land use planning except for aircraft.

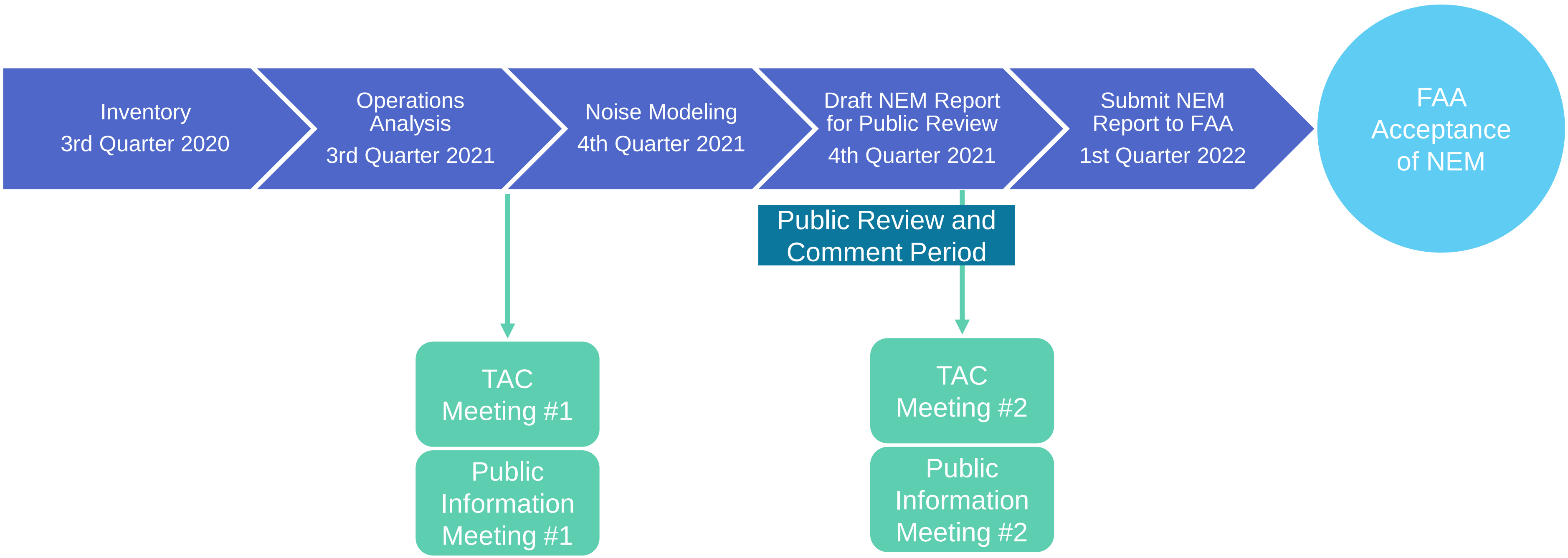
SOURCE:

Title 14 CFR Part 150 Overview – Who Can Regulate Airport Noise?

- **Federal Aviation Administration (FAA):**
  - Controls aircraft in flight
  - Regulates aircraft noise at its source (i.e., aircraft engines)
  - Grants aircraft and pilot certification
- **State of Hawaii Department of Transportation – Airports Division (DOT-A) :**
  - Does not have authority to restrict aircraft operations
  - Manages capital improvement projects and infrastructure
  - Has the authority to adopt local land use guidelines with limitations
- **Local Government**:
  - Does not have authority to restrict aircraft operations
  - Enforces compatible land use through zoning
  - Mandates use of sound-insulating building materials
  - Implements real estate disclosure

Federal law preempts state and local regulations.

Title 14 CFR Part 150 Overview – Schedule



SOURCE: Ricondo & Associates, Inc., October 2021.

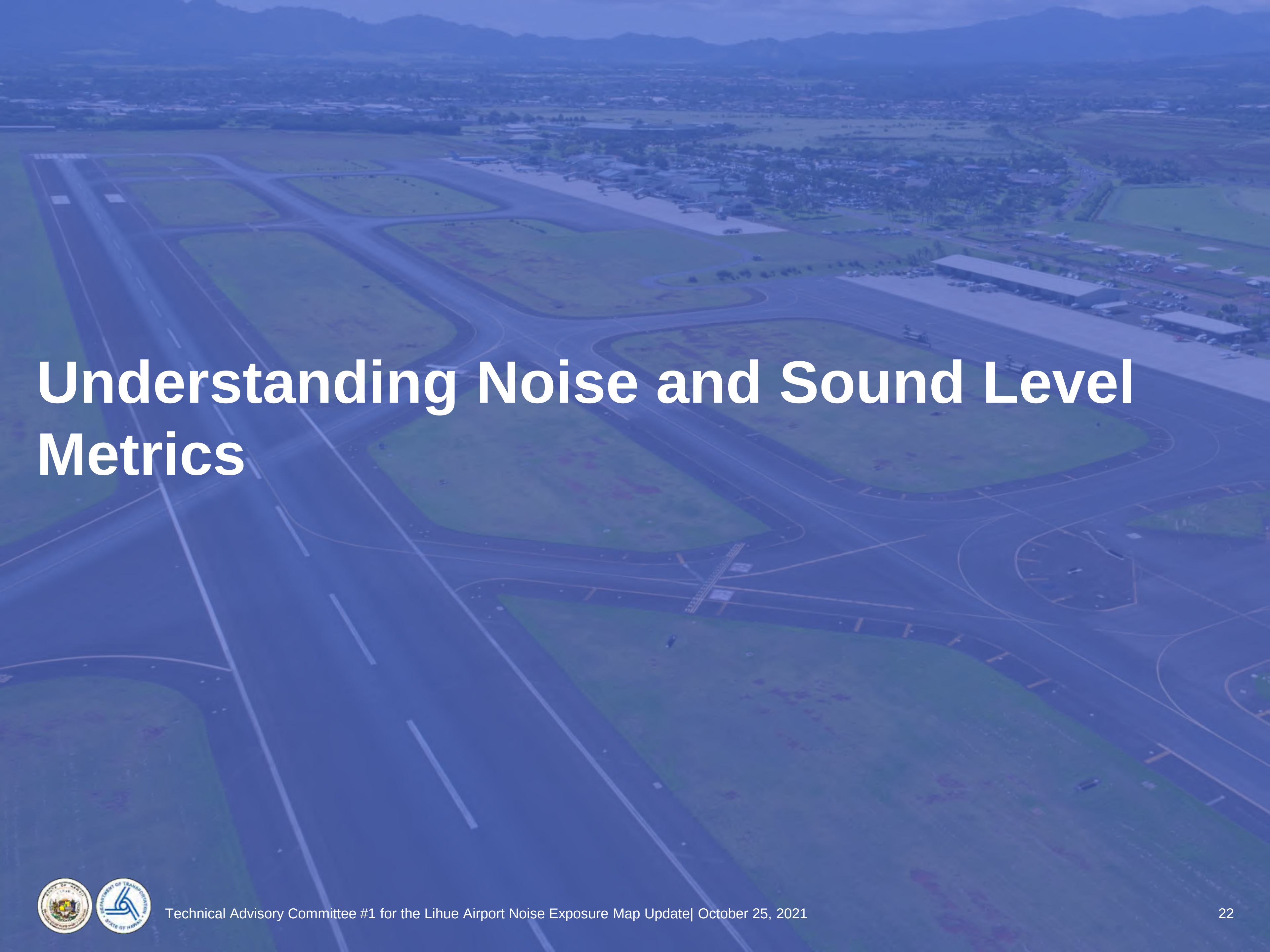
Roles in NEM Update

Roles

- **FAA**
  - Approve any customization to aircraft noise model input
  - Approve operations forecast
  - Review and accept the NEM
- **DOT-A**
  - Sponsor the NEM Update
  - Certify accuracy of the NEM
  - Coordinate with agencies and interested parties
- **Consultant Team**
  - Conduct NEM analysis and prepare documentation
  - Support consultation and public information outreach

Roles (continued)

- **TAC**
  - Provide input and insight on technical issues associated with certain aspects of aviation, airport operations, and land use
- **Public**
  - Review and comment on NEM methodology, existing and forecast airport specific aircraft operations, and aircraft noise concerns



Understanding Noise and Sound Level Metrics

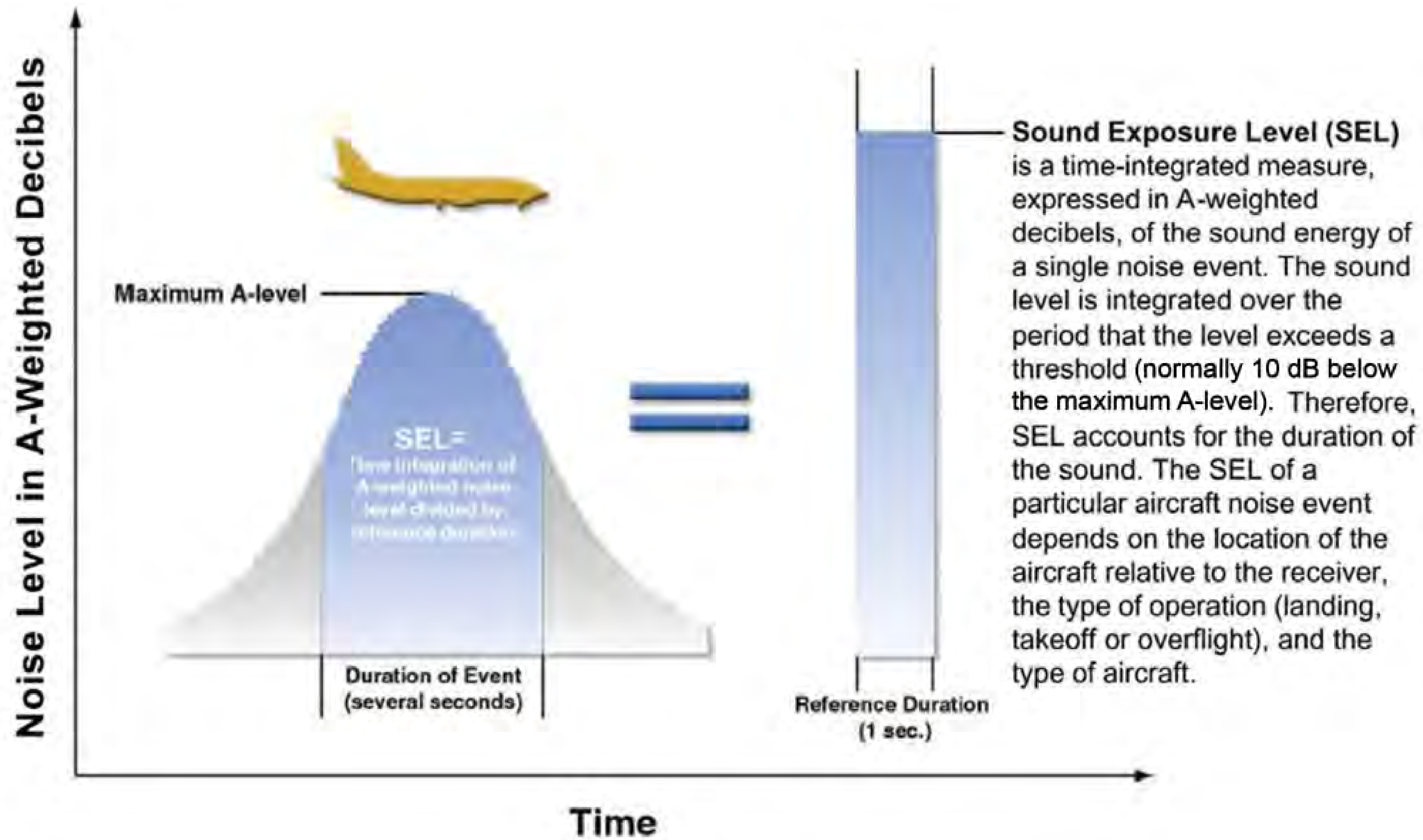
Understanding Noise and Sound Level Metrics

- As required by FAA, airport noise assessments are based on annual Day-Night Average Sound Level (DNL) noise metric
- DNL is expressed in A-weighted decibels (dBA) – focuses on the sound frequencies that are detectible by the human ear
- DNL represents the cumulative effects of all aircraft operations occurring during an average 24-hour period
- Calculated based on an “annual average day” derived from aircraft operations data for an entire calendar year
- In the calculation of DNL, noise events occurring during the nighttime hours (10:00 p.m. to 7:00 a.m.) are increased by a 10-decibel weighting to represent the increased sensitivity of people to noise that occurs at night

Nighttime Penalty Effect:
1 nighttime operation is equivalent to 10 daytime operations

Understanding Noise and Sound Level Metrics

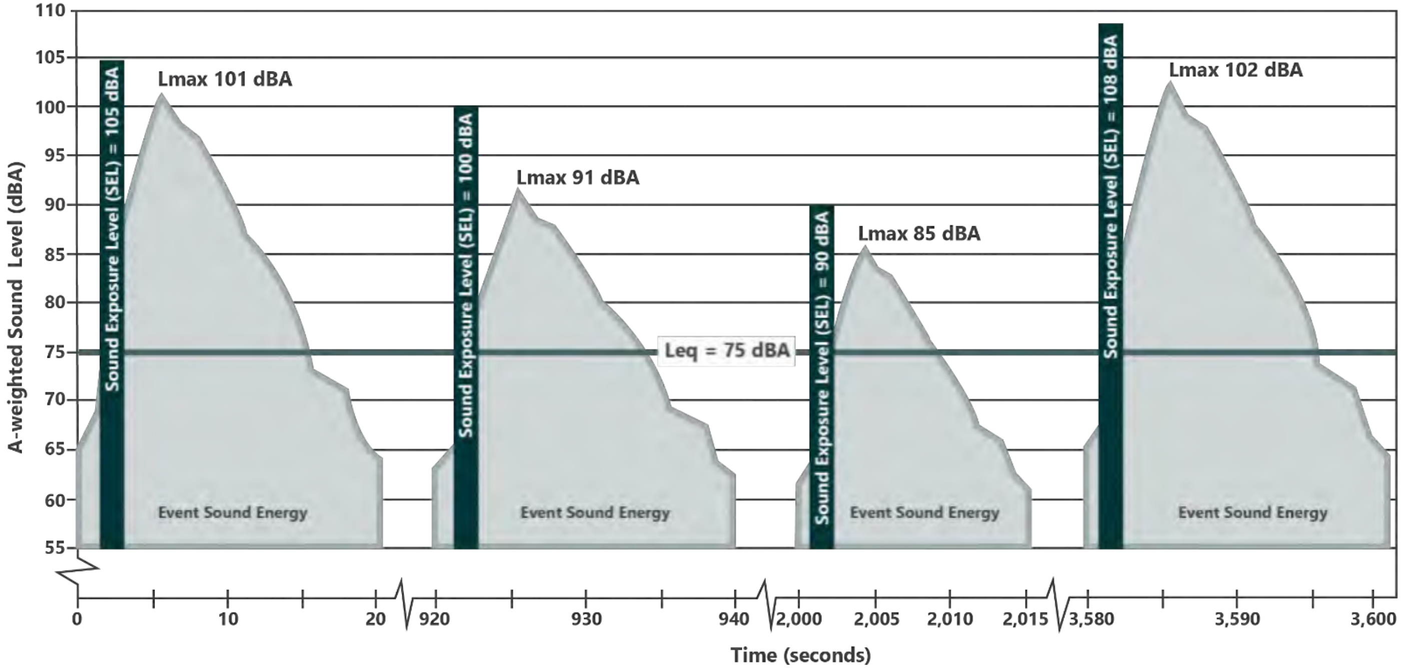
- Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL)



SOURCE: Brown-Buntin Associates, November 2008

Understanding Noise and Sound Level Metrics

- Lmax, SEL and Average Sound Level (L_{eq})



Lmax – Peak instantaneous sound level.

SEL – Sound energy level of an event compressed to one second.

Leq – Equivalent sound level. Total sound level averaged over the duration of the event (1 hour in this example).

Four aircraft overflights occur during a one-hour period.

The peak sound levels (Lmax) range from 85 dBA to 102 dBA.

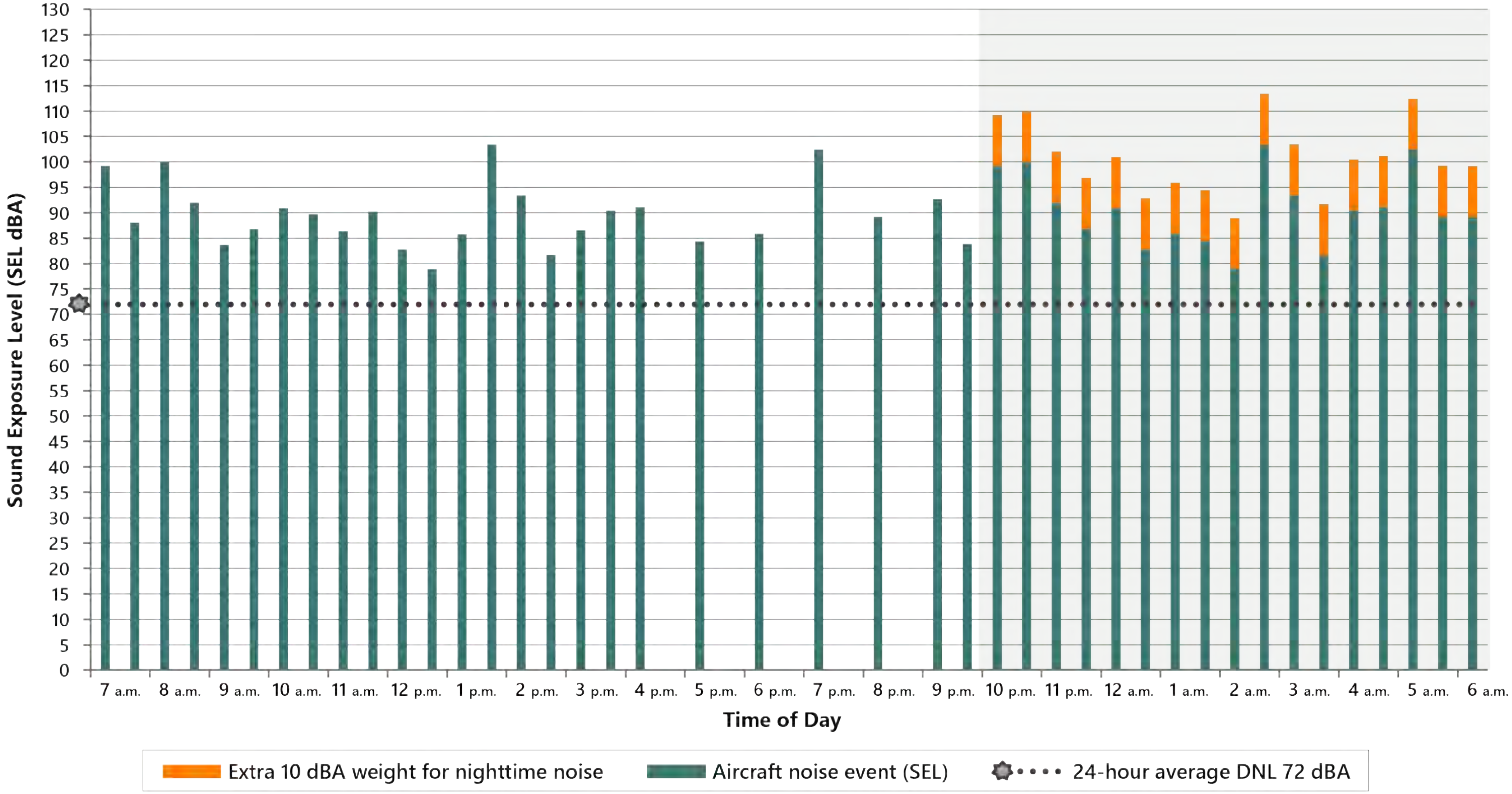
The total sound energy of the events (SEL) range from 90 dBA to 108 dBA.

The cumulative sound level during the hour (Leq) is 75 dBA – the same as a steady sound of 75 dBA throughout the entire hour.

SOURCE: Airport Cooperative Research Program (ACRP), *ACRP Report 15: Aircraft Noise: A Toolkit for Managing Community Expectations* (Figure 6-2, p. 115), 2009; Ricondo & Associates, Inc., October 2021 (updated figure 6-2).

Understanding Noise and Sound Level Metrics

➢ Day-Night Average Sound Level (DNL)



DNL is the metric (or descriptor) that the FAA and the U.S. Department of Defense use to describe the noise environment around civilian and military airports. DNL represents the total, time-weighted noise occurring during a 24-hour period. Noise events after 10:00 p.m. and before 7:00 a.m. are assigned an extra 10 decibels (dBA) in the DNL calculation to reflect the increased sensitivity of people to nighttime noise. For Part 150 studies, the DNL levels are calculated for an "average day" during the study year.

In this example, 42 aircraft noise events occur during the 24-hour period – 25 in daytime and 17 in nighttime hours. The noise levels of the events range from 78 dBA to 103 dBA. The extra 10 dBA assigned to the nighttime events gives them noise levels as high as 113 dBA. The cumulative aircraft noise level for the 24-hour period is DNL 72 dBA, a very high noise level that many people would consider to be annoying at home.

SOURCE: Ricondo & Associates, Inc., October 2021.

Operations Forecast and Study Years

Operations Forecast – Summary

- Based on the Master Plan Update forecast analysis, which was approved by the FAA on September 30, 2020

- Based on 2018 annual aircraft operations and forecast trends prior to COVID-19 Pandemic

- Applied to develop the aircraft activity levels for the future year NEM that represents “at least 5 years” from the year when the NEM Update report is submitted to FAA

SOURCE: Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020

Operations Forecast – COVID-19 Pandemic

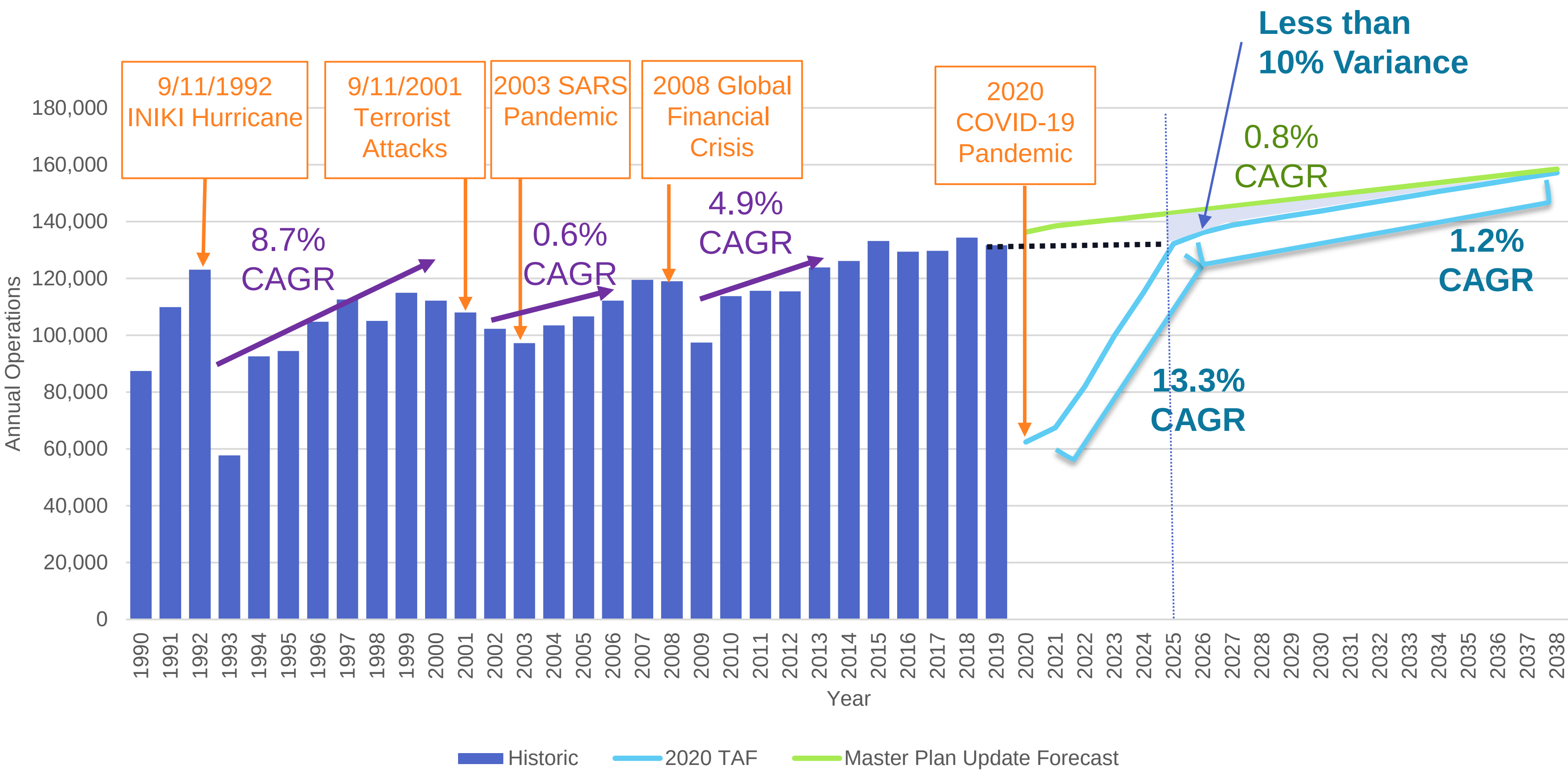
- Considered uncertainties related to the severity and duration of impact remain

- Compared to the 2020 FAA Terminal Area Forecast (TAF)
  - Focus on forecasting the near-term recovery back to 2019 activity
  - Return to 2019 levels in 2025 – a 13.3% compound annual growth rate
  - Master Plan forecast 2027 levels forecast for 2031 in TAF
  - Variance between Master Plan forecast and 2020 TAF less than 10% after recovery to 2019 levels

- Master Plan forecast 2027 levels represent activity levels "at least five years" from expected NEM Update Report submittal to FAA

SOURCE: Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020.

Operations Forecast – COVID-19 Pandemic



NOTE: TAF – Terminal Area Forecast; CAGR – Compound Annual Growth Rate; TAF operations based on federal fiscal year (October to September)
SOURCES: Federal Aviation Administration, 2019 Terminal Area Forecast, February 2020 (historic Federal fiscal year operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020 (Master Plan Update forecast operations, compound annual growth rates and TAF variance to Master Plan forecast from 2025 to 2038).

Study Years

- **2019**
  - Operations have temporarily dropped due to COVID-19 pandemic
  - High short-term growth rate to return to 2019 levels - faster than normal growth rates
    - 2020 to 2025 Master Plan forecast CAGR: 0.8%
    - 2020 to 2025 2020 TAF CAGR: 13.3%
  - 2020 and 2021 are within recovery period and does not represent a reasonable representation of existing conditions
  - Recovery to 2019 operations levels expected to occur within the five-year planning horizon
  - 2019 selected as reasonable representation of existing conditions after recovery from COVID-19 pandemic impacts
- **2027**
  - Master Plan 2027 forecast levels could be reached between 2027 and 2031
  - Forecast operations “at least five years” from submittal of NEM Update to FAA

Forecast – Operations Counts

- Annual Aircraft Itinerant Operations - operations that land at an airport, arriving from outside the airport area, or departs an airport and leaves the airport area

USER CATEGORY	DEFINITION	2019 ACTUAL[1]	2027 FORECAST[2]
Air Carrier	An aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds carrying passengers or cargo for hire or compensation.	27,246	33,919
Air Taxi	An aircraft designed to have a maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less carrying passengers or cargo for hire or compensation.	77,982	86,246
General Aviation	All civil aircraft, except those classified as air carriers or air taxis.	5,868	6,436
Military	All classes of military takeoffs and landings at FAA and FTC facilities.	1,677	1,797
Total	**---**	**112,773**	**128,398**

NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: Federal Aviation Administration, https://aspm.faa.gov/aspmhelp/index/Glossary.html, (accessed October 7, 2021); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Update - Aviation Activity Forecasts*, March 2020.

Forecast – Operations Counts (continued)

- Annual Aircraft Local Operations - operations that remain in the local traffic pattern

USER CATEGORY	2019 ACTUAL[1]	2027 FORECAST[2]
General Aviation	13,572	16,558
Military	488	421
Total	**14,060**	**16,979**

NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: Federal Aviation Administration, https://aspm.faa.gov/aspmhelp/index/Glossary.html, (accessed October 7, 2021); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Update - Aviation Activity Forecasts*, March 2020.

- Annual Total Operations

2019 ACTUAL[1]	2027 FORECAST[2]
126,833	**145,377**

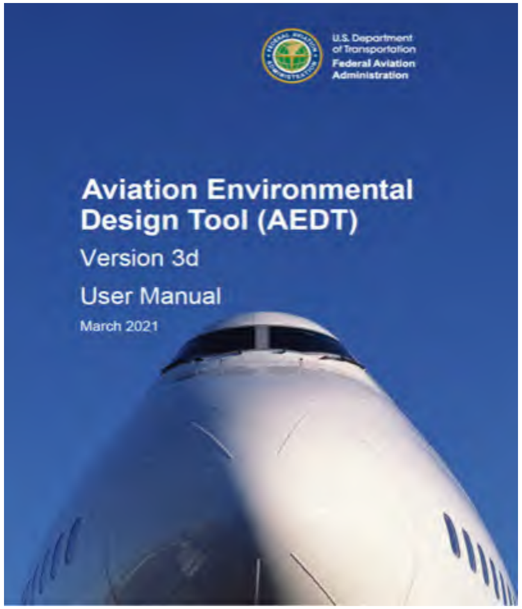
NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: Federal Aviation Administration, https://aspm.faa.gov/aspmhelp/index/Glossary.html, (accessed October 7, 2021); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Update - Aviation Activity Forecasts*, March 2020.

Noise Modeling Methodology and Inputs

Noise Model Methodology – Overview

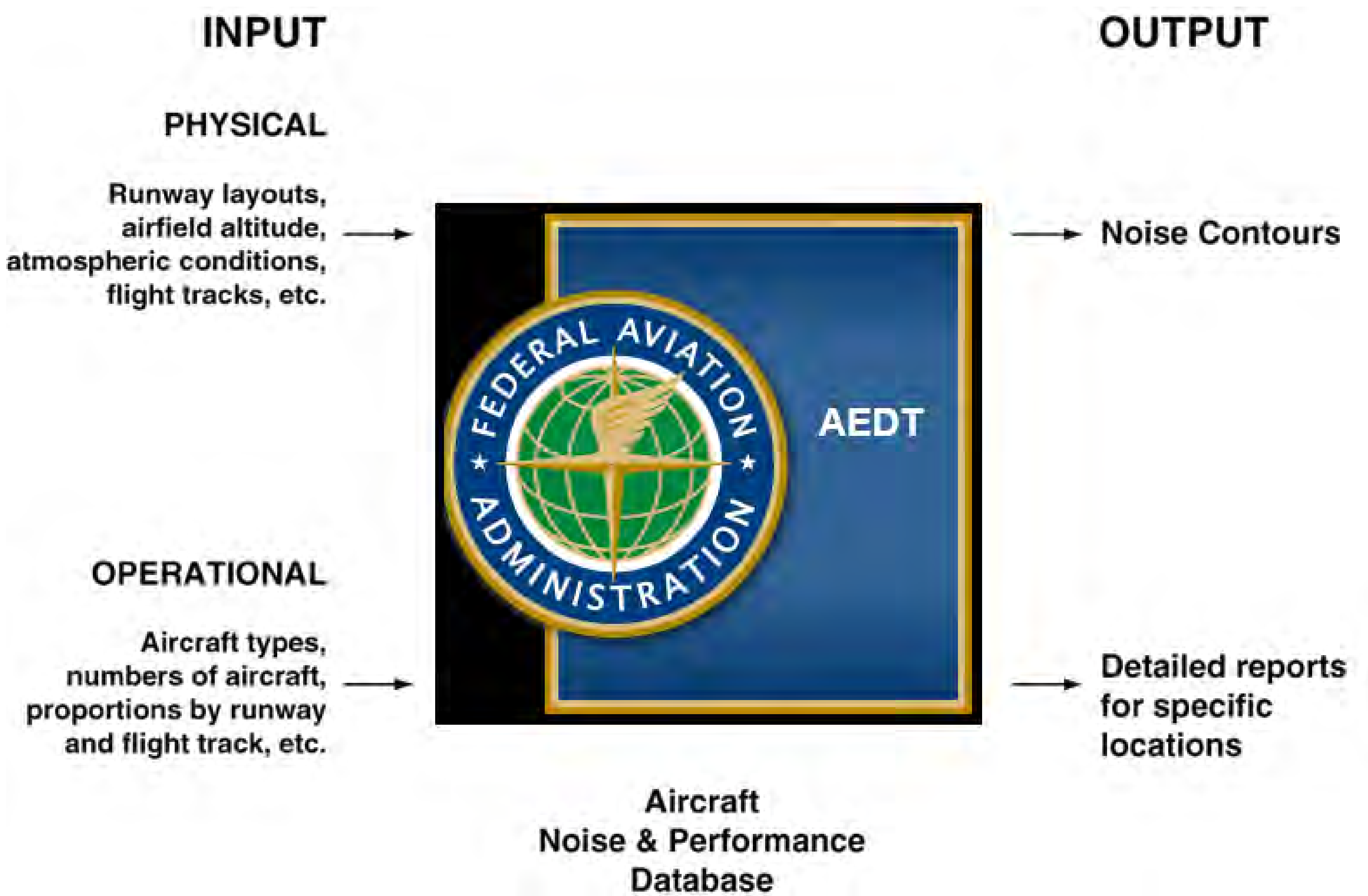
- Aircraft noise modeling allows:
  - Calculation of aircraft noise exposure at any location
  - Illustration of annual average aircraft noise exposure
  - Forecast of future aircraft noise exposure
  - Evaluation of changes in noise impacts due to changes in runway configuration or use
  - Evaluation of changes in aircraft fleet mix and/or number of operations
  - Assessment of operational procedures

- Aviation Environmental Design Tool (AEDT) replaced the Integrated Noise Model (INM) when it was released in 2015. The current version, AEDT 3d, is being used for this 14 CFR Part 150 NEM Update study.



SOURCE: Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT): Version 3d Technical Manual,* March 2021.

Noise Model Methodology – How it Works



SOURCE: Federal Aviation Administration

Noise Model Methodology - Inputs

- Inputs affecting the size of the contour include:
  - Operation Levels – User input
  - Aircraft Fleet Mix – User input based on AEDT aircraft database
  - Time of Day Distribution – User input
  - Aircraft Performance Characteristics – AEDT or FAA-approved user defined data
- Inputs affecting the shape of the contour/distribution of noise exposure include:
  - Runway Use – User input
  - Flight Track Locations and Use – User input

Average Annual Itinerant Operations & Time of Day

- **Itinerant – operations that land at an airport, arriving from outside the airport area, or departs an airport and leaves the airport area**

- **Existing – 2019 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [4]	NIGHT [5]	TOTAL	DAY [4]	NIGHT [5]	TOTAL	TOTAL
Heavy Jet [1]	3.24	0.09	3.34	2.78	0.56	3.34	**6.67**
Large and Small Jets [2 3]	35.07	9.06	44.14	35.27	8.87	44.14	**88.27**
Piston/Turboprop	13.63	5.86	19.49	13.70	5.80	19.49	**38.99**
Military	1.72	0.57	2.29	1.97	0.32	2.29	**4.59**
Helicopter	82.73	2.50	85.22	82.73	2.50	85.22	**170.45**
TOTAL ITINERANT OPERATIONS [6]	**136.39**	**18.09**	**154.48**	**136.44**	**18.04**	**154.48**	**308.97**

- **Future – 2027 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [4]	NIGHT [5]	TOTAL	DAY [4]	NIGHT [5]	TOTAL	TOTAL
Heavy Jet [1]	1.86	0.14	2.00	1.63	0.37	2.00	**4.00**
Large and Small Jets [2 3]	44.32	11.33	55.65	44.68	10.98	55.66	**111.31**
Piston/Turboprop	15.34	7.27	22.61	15.41	7.20	22.61	**45.22**
Military	1.85	0.62	2.46	2.12	0.34	2.46	**4.92**
Helicopter	90.43	2.73	93.16	90.43	2.73	93.16	**186.32**
TOTAL ITINERANT OPERATIONS	**153.79**	**22.10**	**175.88**	**154.26**	**21.63**	**175.89**	**351.78**

NOTES:

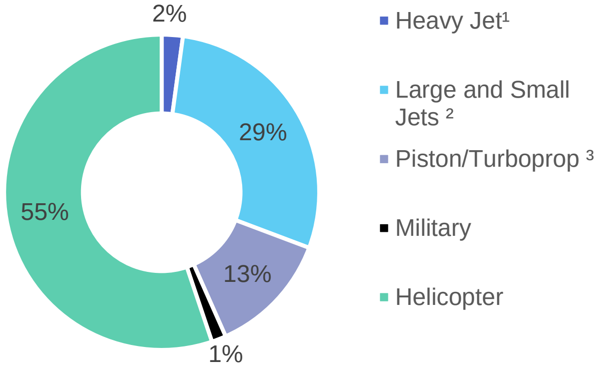
1 Heavy Jet - Aircraft weighing more than 255,000 pounds
2 Large Jet - Aircraft weighing more than 41,000 and up to 255,000 pounds
3 Small Jet – Aircraft weighing less than 41,000 pounds
4 Day = 7:00 a.m. to 9:59 p.m.
5 Night = 10:00 p.m. to 6:59 a.m.
6 Totals may not add due to rounding.

SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

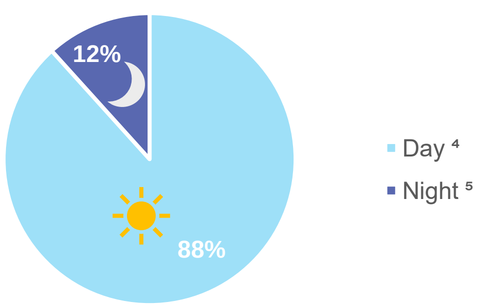
Average Annual Itinerant Operations & Time of Day

➢ Existing – 2019 DRAFT

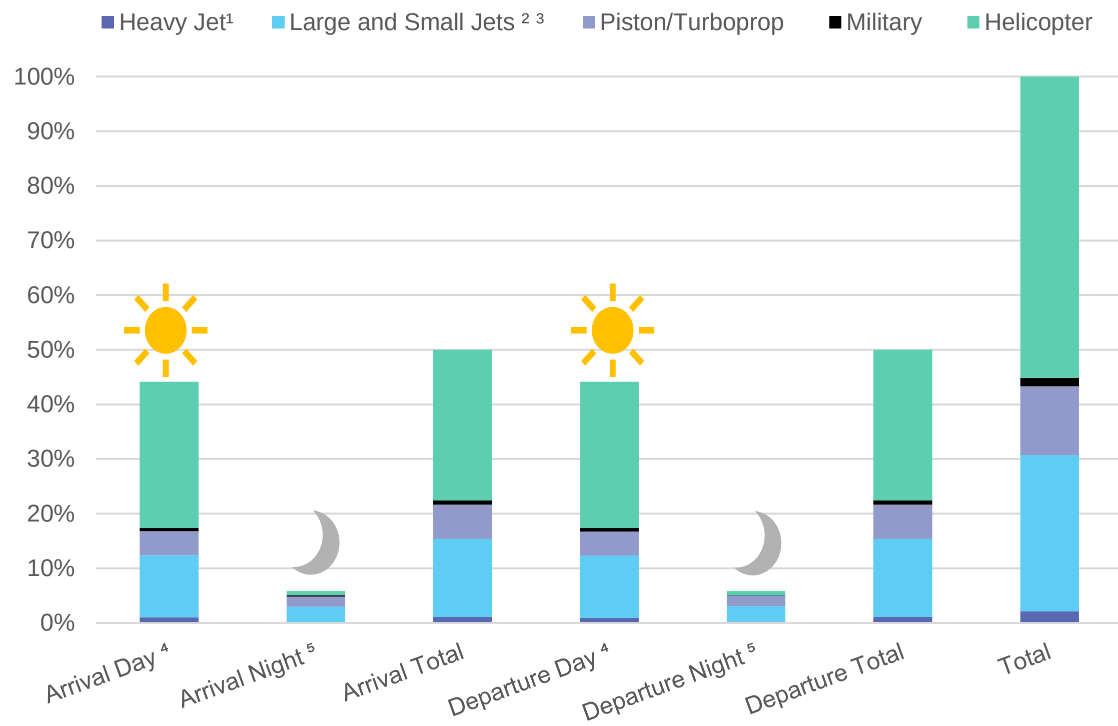
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



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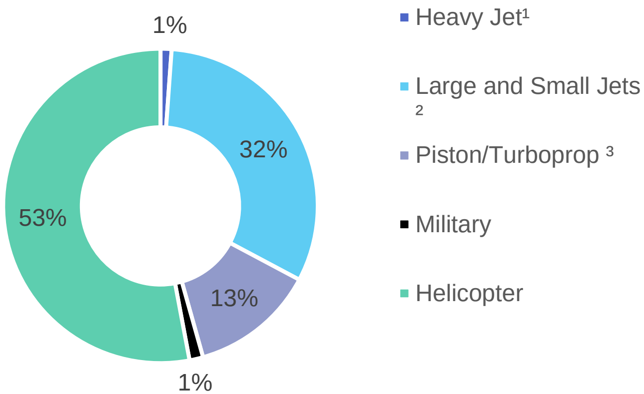
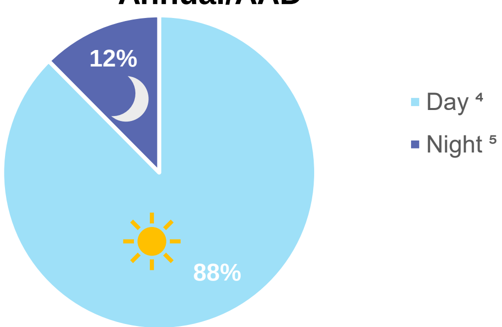
Average Annual Itinerant Operations & Time of Day

Future – 2027 DRAFT

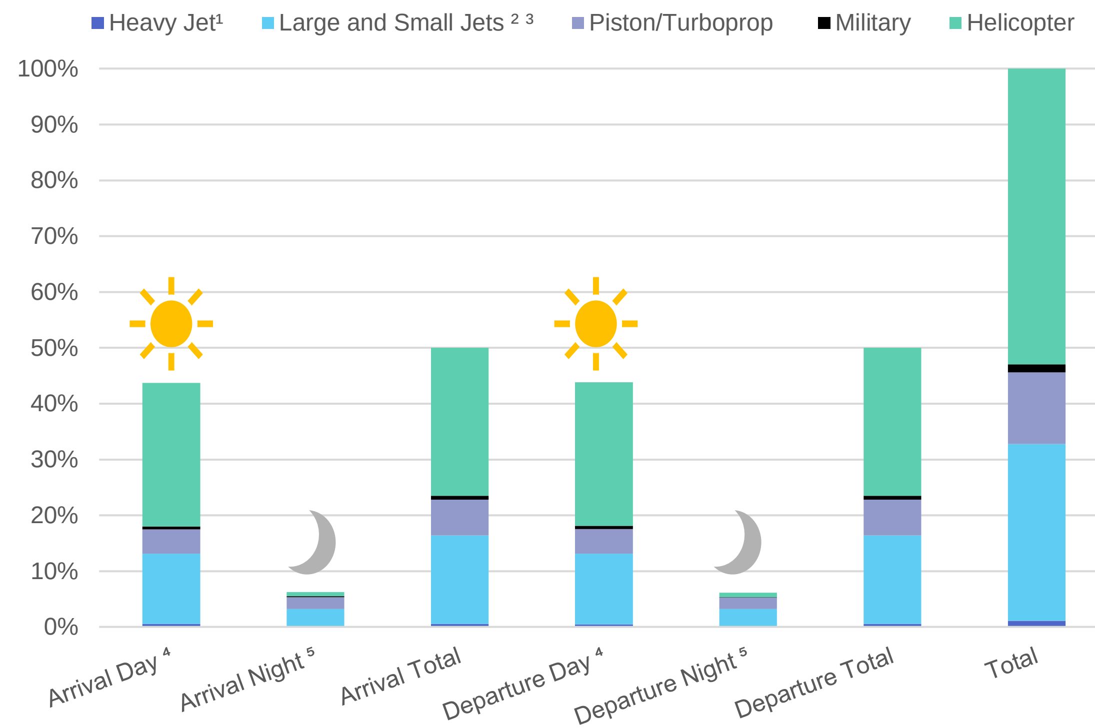
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



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SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

Average Annual Local Operations & Time of Day

- Local – operations that remain in the local traffic pattern
- Existing – 2019 (DRAFT)

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [3]	NIGHT [4]	TOTAL	DAY [3]	NIGHT [4]	TOTAL	TOTAL
General Aviation Jet [1]	1.46	0.76	2.22	1.46	0.76	2.22	**4.45**
Piston/Turboprop	4.76	2.58	7.34	4.76	2.58	7.34	**14.68**
Military [2]	0.50	0.00	0.50	0.50	0.00	0.50	**1.00**
Helicopter	8.92	0.27	9.19	8.92	0.27	9.18	**18.37**
TOTAL LOCAL OPERATIONS [5]	**15.64**	**3.61**	**19.25**	**15.64**	**3.61**	**19.25**	**38.50**

- Future – 2027 (DRAFT)

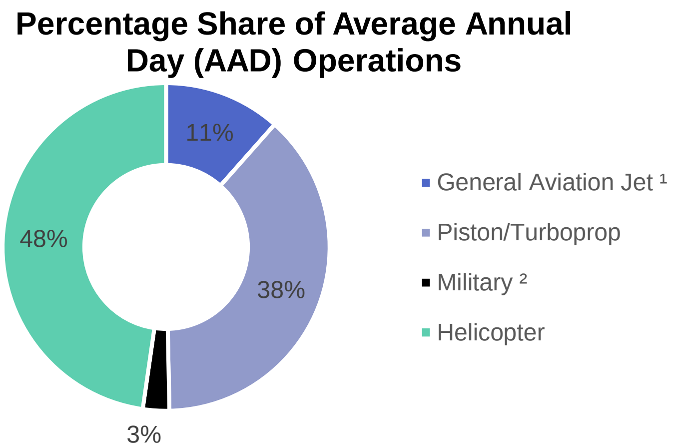
	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [3]	NIGHT [4]	TOTAL	DAY [3]	NIGHT [4]	TOTAL	TOTAL
General Aviation Jet [1]	1.82	0.96	2.77	1.82	0.96	2.77	**5.54**
Piston/Turboprop	5.74	3.11	8.86	5.74	3.11	8.86	**17.71**
Military [2]	0.58	0.00	0.58	0.58	0.00	0.58	**1.15**
Helicopter	10.73	0.32	11.06	10.73	0.32	11.06	**22.11**
TOTAL LOCAL OPERATIONS [5]	**18.86**	**4.39**	**23.26**	**18.86**	**4.39**	**23.26**	**46.52**

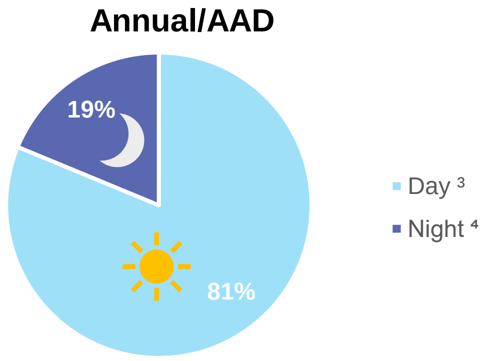
NOTES:
1 General Aviation Jet – Non-commercial jet aircraft.
2 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories,
3 Day = 7:00 a.m. to 9:59 p.m.
4 Night = 10:00 p.m. to 6:59 a.m.
5 Totals may not add due to round

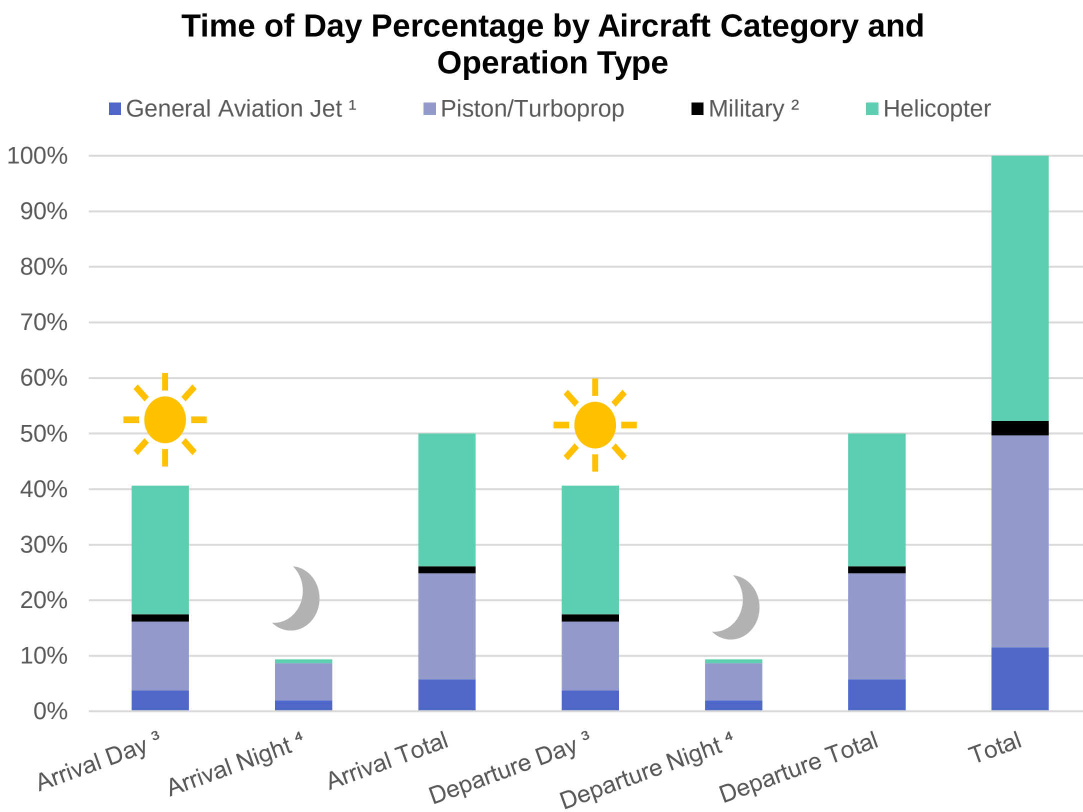
SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

Average Annual Local Operations & Time of Day

Existing – 2019 (DRAFT)







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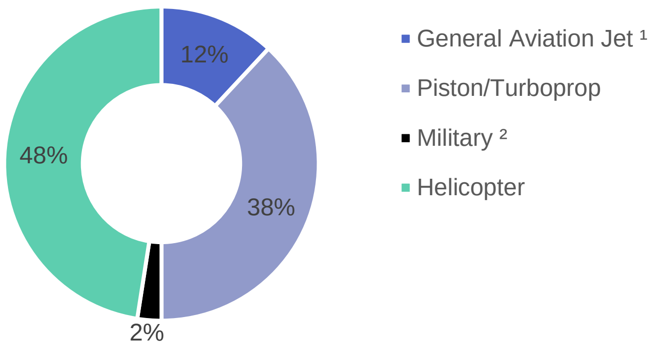
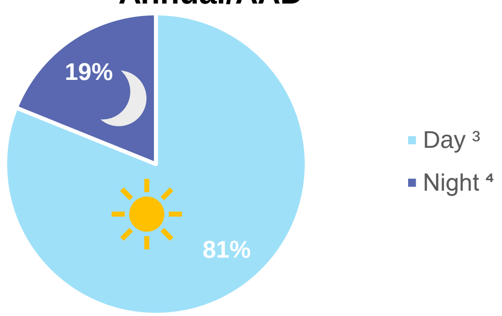
Average Annual Local Operations & Time of Day

➢ Future – 2027 (DRAFT)

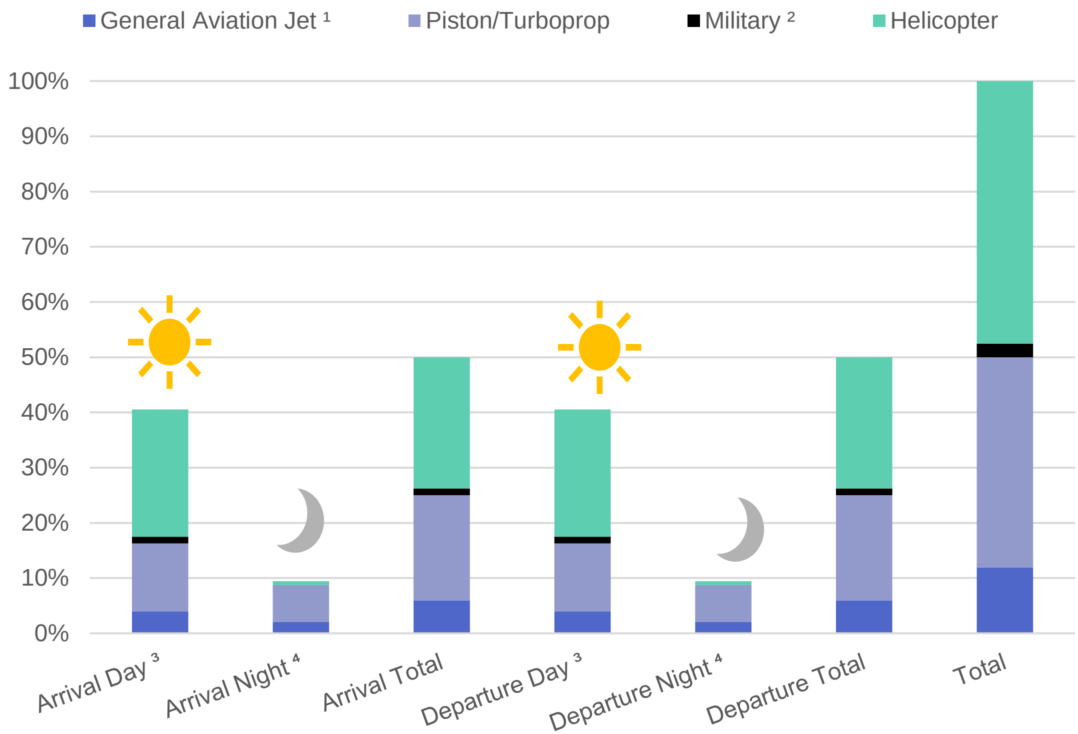
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



NOTES:

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4 Night = 10:00 p.m. to 6:59 a.m.

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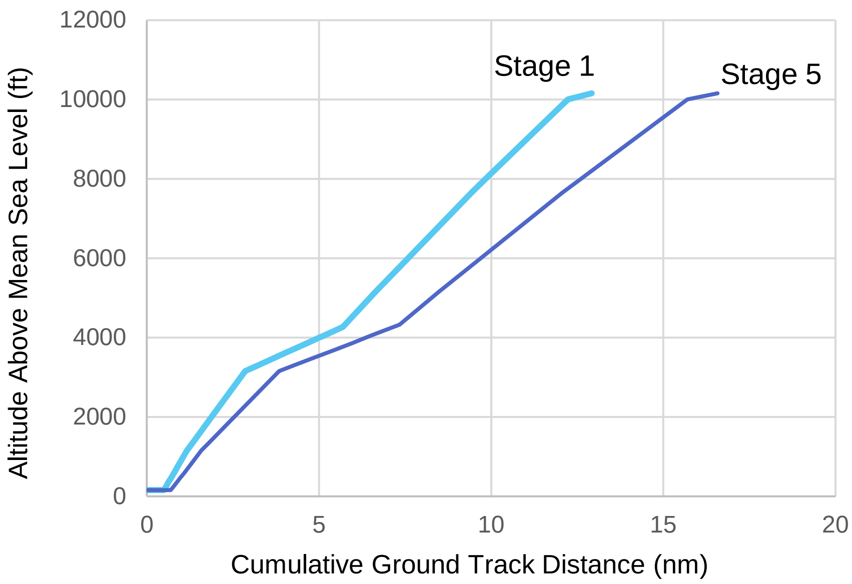
Noise Model Methodology – Stage Length

- Departure flight distance from airport to destination

STAGE LENGTH CATEGORIES	
CATEGORY	STAGE LENGTH (NAUTICAL MILES)
1	0 – 500
2	500 – 1,000
3	1,000 – 1,500
4	1,500 – 2,500
5	2,500 – 3,500
6	3,500 – 4,500
7	4,500 – 5,500
8	5,500 – 6,500
9	6,500 +

Example: Stage Length Comparison for Boeing 717-200



- Composite Stage Length Distribution for Commercial Aircraft

	STAGE LENGTH					
YEAR	1	2	3	4	5	TOTAL
EXISTING - 2019	63.32%	0.00%	0.00%	33.53%	3.15%	100.00%
FUTURE - 2027	59.25%	0.00%	0.00%	37.42%	3.33%	100.00%

SOURCES: Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT): Version 3d Technical Manual,* March 2021 (stage length categories); Ricondo & Associates, Inc., December 2016. (runway use percentage for local operations); Diio Mi, October 2021 (ATCT operation counts from FAA's OPSNET and Innovata schedule); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update: Aviation Activity Forecasts*, March 2021; Ricondo & Associates, Inc., October 2021 (stage length comparison for Boeing 717-200).

Noise Model Methodology – Runway Use

Itinerant Operations
2019 & 2027

LEGEND

Arrivals

Departures

NOTES:
1 Daytime = 7:00 a.m. to 9:59 p.m.
2 Nighttime = 10:00 p.m. to 6:59 a.m.
3. Totals do not add up due to rounding

SOURCES: Woolpert, August 2019 (aerial imagery); State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative - LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Runway Use

Local Operations
2019 & 2027

LEGEND

Arrivals

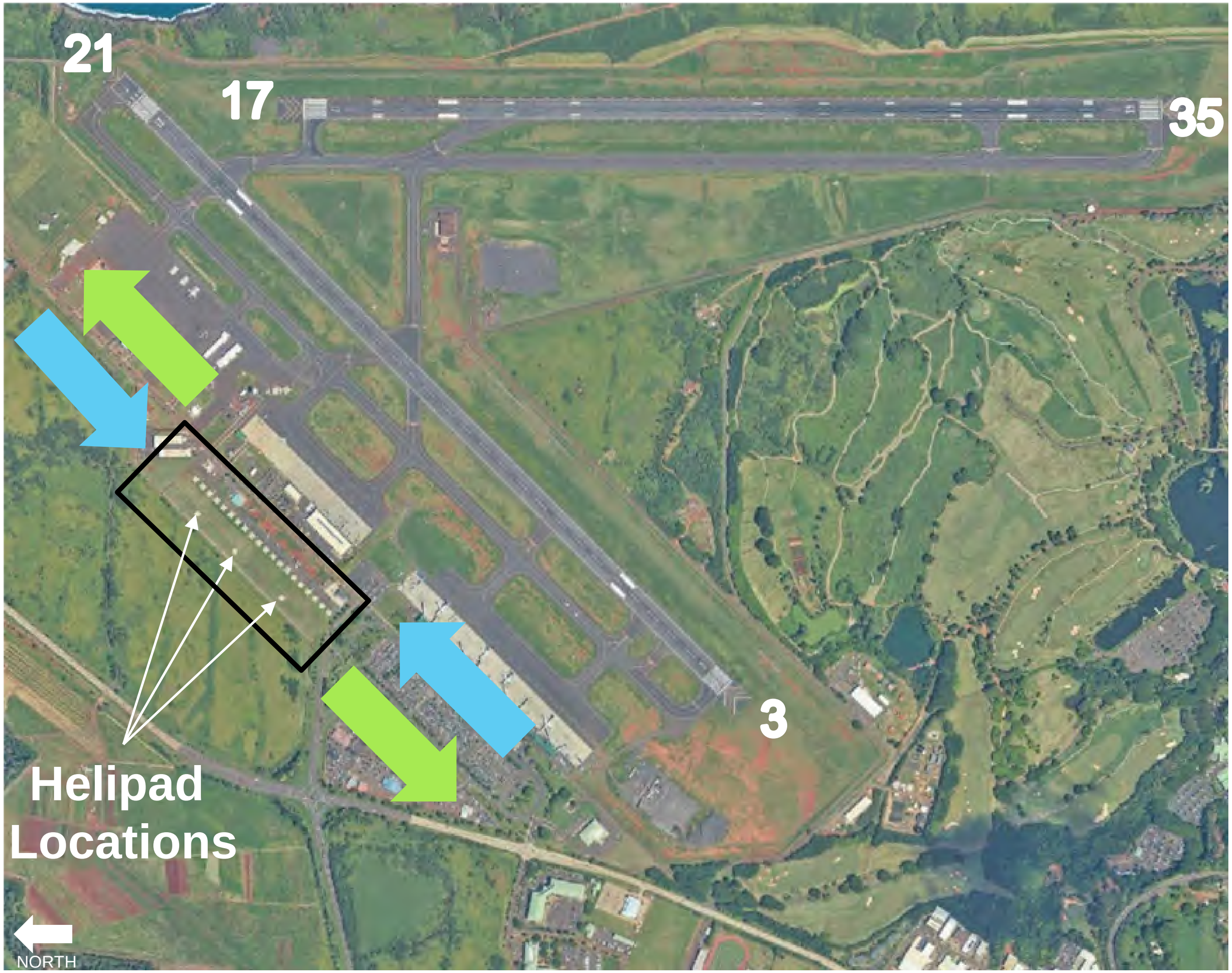
Departures

NOTES:
1 Daytime = 7:00 a.m. to 9:59 p.m.
2 Nighttime = 10:00 p.m. to 6:59 a.m.
3. Totals do not add up due to rounding

SOURCES: Woolpert, August 2019 (aerial imagery); State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative - LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Helipad Use

- Three helipads
- Modeled as one helipad



LEGEND

Primary Arrivals

Primary Departures

SOURCES: Woolpert, August 2019 (aerial imagery); Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Flight Tracks

NORTH

Generalized Fixed-Wing

Arrivals

Departures

LEGEND

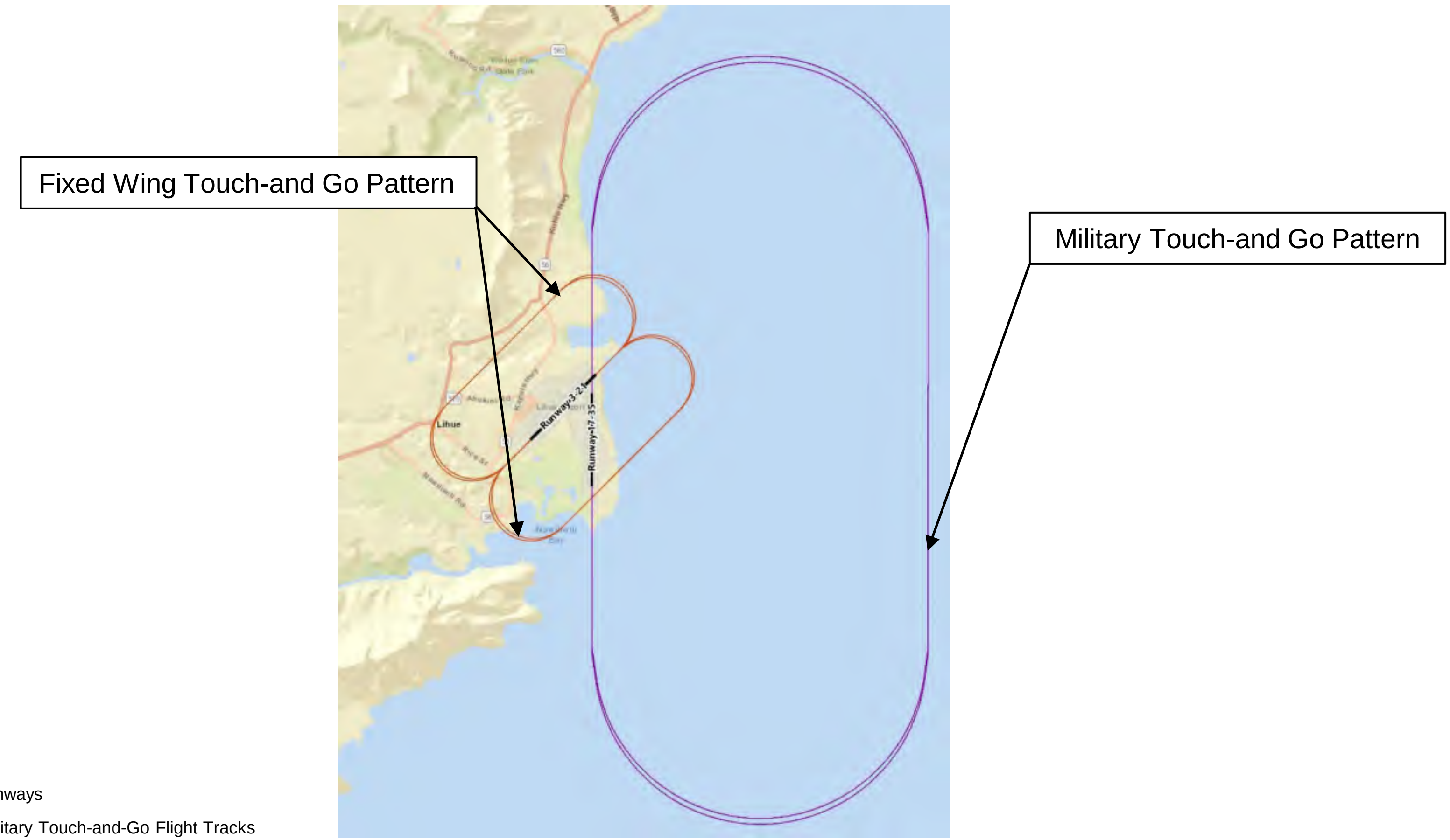
- Existing Runways
- Modeled Arrival Aircraft Flight Tracks
- Modeled Departure Aircraft Flight Tracks

SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Noise Model Methodology – Flight Tracks

Generalized Fixed-Wing/Military
Touch-and-Go

NORTH



LEGEND

- Existing Runways
- Modeled Military Touch-and-Go Flight Tracks
- Modeled Fixed-Wing Touch-and-Go Pattern

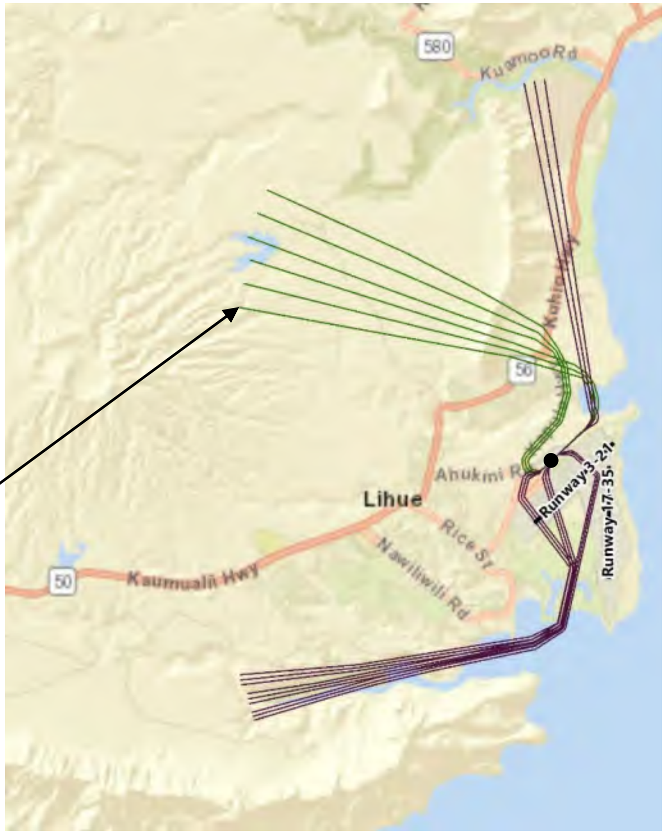
SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Noise Model Methodology – Flight Tracks

Generalized Helicopter

Arrivals and Departures

NORTH



Helicopters Approach: 800 to 1,000 feet (AGL)

NOTE: AGL – Above Ground Level

LEGEND

- ● Existing Helipads
- Existing Runways
- Modeled Helicopter Arrival Aircraft Flight Tracks
- Modeled Helicopter Departure Aircraft Flight Tracks

SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Noise Model Methodology – Flight Tracks

NORTH

Generalized Helicopter
Touch-and-Go

LEGEND

- Existing Helipads
- Existing Runways
- Modeled Helicopter Touch-and-Go Pattern

SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Land Use Compatibility

Land Use Compatibility – FAA

Land use	Yearly day-night average sound level (Ldn) [DNL] in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail -- building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade – general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps.	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation.	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NLR: Noise Level Reduction

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Notes for Table 1

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Source: 14 CFR Part 150, Appendix A, Table 1. [Bracketed material and color added by Ricondo & Associates, Inc.]

Land Use Compatibility – State of Hawaii

LAND USE	YEARLY DAY-NIGHT NOISE LEVEL (DNL) IN DECIBLES					
	BELOW 60	60-65	65-70	70-75	75-80	80-85
Residential						
Low density residential, resorts, and hotels (outdoor facility)	Y(1)	N(2)	N	N	N	N
Low density apartment with moderate outdoor use	Y	N(2)	N	N	N	N
High density apartment with limited outdoor use	Y	N(2)	N(2)	N	N	N
Transient lodgings with limited outdoor use	Y	N(2)	N(2)	N	N	N
Public Use						
Schools, day-care centers, libraries, and churches	Y	N(3)	N(3)	N(3)	N	N
Hospitals, nursing homes, clinics, and health facilities	Y	Y(4)	Y(4)	Y(4)	N	N
Indoor auditoriums and concert halls	Y(3)	Y(3)	N	N	N	N
Governmental services and office buildings serving the general public	Y	Y	Y(4)	Y(4)	N	N
Transportation and parking	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Commercial Use and Government Use						
Offices – government, business ,and professional	Y	Y	Y(4)	Y(4)	N	N
Wholesale and retail--building materials, hardware, and heavy equipment	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Airport businesses – car rental, tours, lei stands, ticket offices, etc.	Y	Y	Y(4)	Y(4)	N	N
Retail, restaurants, shopping centers, financial institutions, etc.	Y	Y	Y(4)	Y(4)	N	N
Power plants, sewage treatment plants, and base yards	Y	Y	Y(4)	Y(4)	Y(4)	N
Studios without outdoor sets, broadcasting, production facilities, etc.	Y(3)	Y(3)	N	N	N	N
Manufacturing, Production, and Storage						
Manufacturing, general	Y	Y	Y(4)	Y(4)	Y(4)	N
Photographic and optical	Y	Y	Y(4)	Y(4)	N	N
Agriculture (except livestock) and forestry	Y	Y(5)	Y(5)	Y(5)	Y(5)	Y(5)
Livestock farming and breeding	Y	Y(5)	Y(5)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(6)	Y(6)	N	N	N
Outdoor music shells, amphitheaters	Y(6)	N	N	N	N	N
Nature exhibits and zoos, neighborhood parks	Y	Y	N	N	N	N
Amusements, beach parks, active playgrounds, etc.	Y	Y	Y	Y	N	N
Public golf courses, riding stables, cemeteries, gardens, etc.	Y	N	N	N	N	N
Professional/resort sport facilities, locations of media events, etc.	Y(6)	N	N	N	N	N
Extensive natural wildlife and recreation areas	Y(6)	N	N	N	N	N

Numbers in parentheses refer to notes

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NOTES:

Y – yes, land use and related structures are compatible without restrictions.

N – no, land use and related structures are not compatible and should be prohibited.

(1) A noise level 60 DNL does not eliminate all risks of adverse noise impacts from aircraft noise. However, the 60 DNL planning level has been selected by the Hawaii State Department of Transportation – Airports Division as an appropriate compromise between the minimal risk level of 55 DNL and significant risk level of 65 DNL.

(2) Where the community determines that these uses must be allowed, Noise Level Reduction (NLR) measures to achieve interior levels of 45 DNL or less should be incorporated into building codes and be considered in individual approvals. Normal local construction employing natural ventilation can be expected to provide an average NLR, and will not eliminate outdoor noise problems.

(3) Because of the DNL noise descriptor system represents a 24-hour average of individual aircraft noise events, each of which can be unique in respect to amplitude, duration, and tonal content, the NLR requirements should be evaluated for the specific land use, interior acoustical requirements, and properties of the aircraft noise events. NLR requirements should not be based solely upon the exterior DNL exposure level.

(4) Measures to achieve required NLR must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

(5) Residential buildings require NLR. Residential buildings should not be located where noise is greater than 65 DNL.

(6) Impact of amplitude, duration, frequency, and tonal content of aircraft noise events should be evaluated.

SOURCE: State of Hawaii Department of Transportation - Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Update,* April 2013.

Land Use Compatibility – FAA vs. State of Hawaii

- Hawaii guidelines developed due to the outdoor life-style of the people and that majority of residences are naturally ventilated
- Considers land uses below DNL 60 dBA as compatible
- Utilizes DNL 55 dBA for the required buyer notification boundary

State Land Use Compatibility Table Changes to FAA Table

	TABLE SET UP	TABLE FOOTNOTES
1	Criteria of yearly DNL ranges are below DNL 60 TO DNL 85 in lieu of below DNL 65 to Over DNL 85.	Community determines residential uses to achieve NLR interior levels of DNL 45. Normal local construction can be expected to provide an average NLR of approximately 9 dBA.
2	Residential land use category is delineated into low density and high density.	NLR requirements should be evaluated and not be based solely upon the exterior DNL exposure level for schools, indoor auditoriums, concert halls, studios without outdoor sets, broadcasting, and production facilities.
3	Additional land use categories included under recreation: professional/resort sport facilities, locations of media events, extensive natural wildlife, and recreation areas	No indication of dBA measurement to achieve required NLR for the design and construction of buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

NOTE: NLR – Noise Level Reduction
SOURCE: State of Hawaii Department of Transportation - Airports Division, *Lihue Airport Noise Compatibility Program: Volume 1-Noise Exposure Map Report*, May 1989.

Existing Land Use Map

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); SSFM International, Inc., Kauai General Plan, 2018 (land use boundaries); State of Hawaii Department of Transportation – Airports Division, Lihue Airport Plan, October 2020 (existing and future airport property boundaries, and future easements); County of Kauai, *https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021);* Wilson Okamoto Corporation and State of Hawaii DOT-Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements-Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads and county boundary); Ricondo & Associates, Inc., March 2021 (multi-family residential).

Existing Zoning Map

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); SSFM International, Inc., 2018 (Kauai County Zoning Ordinance); State of Hawaii Department of Transportation – Airports Division, Lihue Airport Plan, October 2020 (existing and future airport property boundaries, and future easements); US Census Bureau, 2021 (roads and county boundary); Ricondo & Associates, Inc., March 2021 (multi-family residential).

Public Involvement Plan

Public Involvement Plan

- Public Information Meeting #1 – October 26th
- Visit - www.lihmasterplan.com
  - Source for updates and document for review
  - Register to get updates
  - Provide comments
- Release of Draft NEM Update Report for public review and comment
- Public Information Meeting #2 - To Be Determined

Next Steps

Next Steps

- Conduct Public Information Meeting #1 – October 26th
- Finalize Noise Modeling
- Draft NEM Update Report
- Provide Draft NEM Update Report for Review
- Next Meeting – To Be Determined

Questions and Answers

APPENDIX C.3

Technical Advisory Committee Meeting #2 Presentation

Lihue Airport Noise Exposure Map Update

Technical Advisory Committee Meeting #2

May 4, 2022

Technical Advisory Committee Roll Call

Welcome

- Opening remarks by Herman Tuiolosega, Hawaii Department of Transportation, Airports, Planning Division Section Head

- Follow up remarks by Ura Yvan, Ricondo & Associates, Inc. – Meeting Moderator
  - **Purpose**
  - **Draft NEM Report is posted on www.lihmasterplan.com**
  - **Comments must be received by 5:00 p.m. HST on May 16, 2022**, via:
    - The website at the bottom of the "Stay Informed" page
    - Mail, post-marked May 16, 2022, sent to:

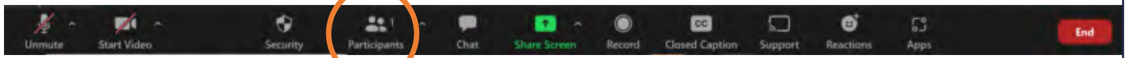
Hawaii Department of Transportation – Airports Division
Attn: Mr. Ray Severn
400 Rodgers Blvd. Suite 700
Honolulu, Hawaii 96819

SCAN ME

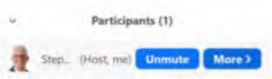
Zoom Protocol

- Proper Identification
  - Update your Name
    1. First and Last Name
    2. Abbreviated Organization Name
    3. Ex: Raymond Severn - HDOTA
  - Names to be used to identify Technical Advisory Members

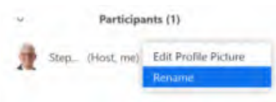
1. At the bottom of the screen in Zoom, click on the “Participants” icon.



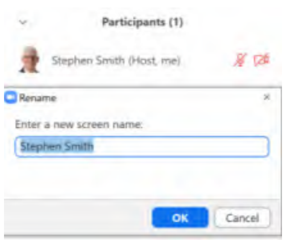
2. A list of participants will appear on the right-hand side of the Zoom room. Hover over your name and click the “More” button.



3. Click the “Rename” option



4. Enter your name in the “Enter a new screen name” field. If available on the screen, make sure to uncheck “Remember my name for future meetings” if you wish not to carry the changes forward for future Zoom meetings.



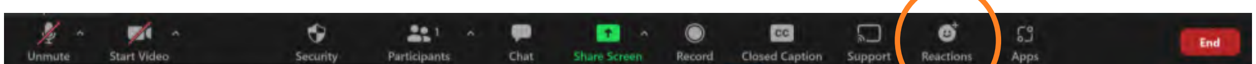
Note: some users may have a different version of Zoom with different locations of commands, but the participant symbology should be the same.

Zoom Protocol

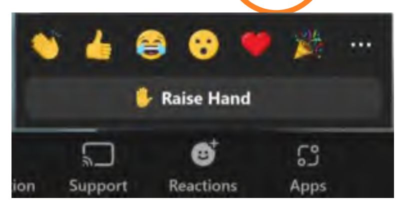
- Commenting
  - All participants will be muted by the moderator
  - Moderator will call on participants who:

1. Raise hand physically (if video is on)
2. Raise hand virtually (hand feature)

Hand feature: select “Reactions” icon then



Select “Raise Hand” button



3. Comment in chat

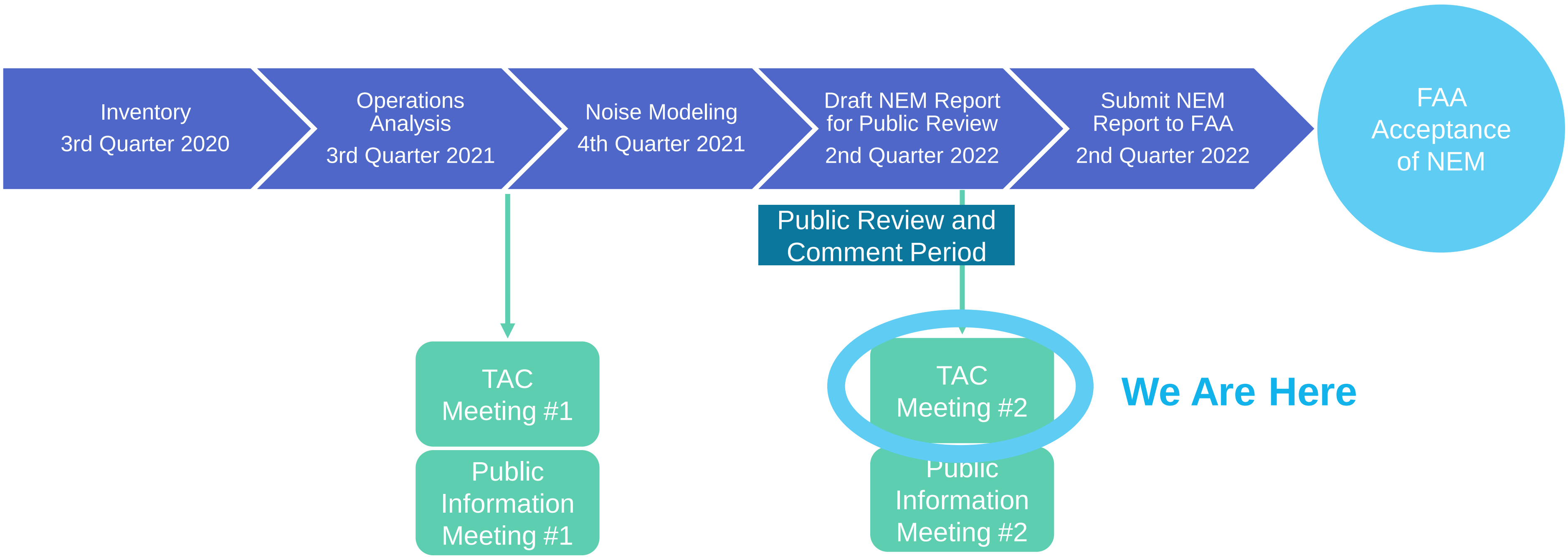
4. Send an email to uyvan@ricondo.com (if none of these features work and you are a committee member with a question or comment)

Agenda

1. Title 14 CFR Part 150 NEM Update Status
2. Methodology Summary
3. Land Use Compatibility Overview
4. TAC Meeting #1 Comment
5. Noise Analysis Results
6. Next Steps

Title 14 Code of Federal Regulations (CFR) Part 150 NEM Update Status

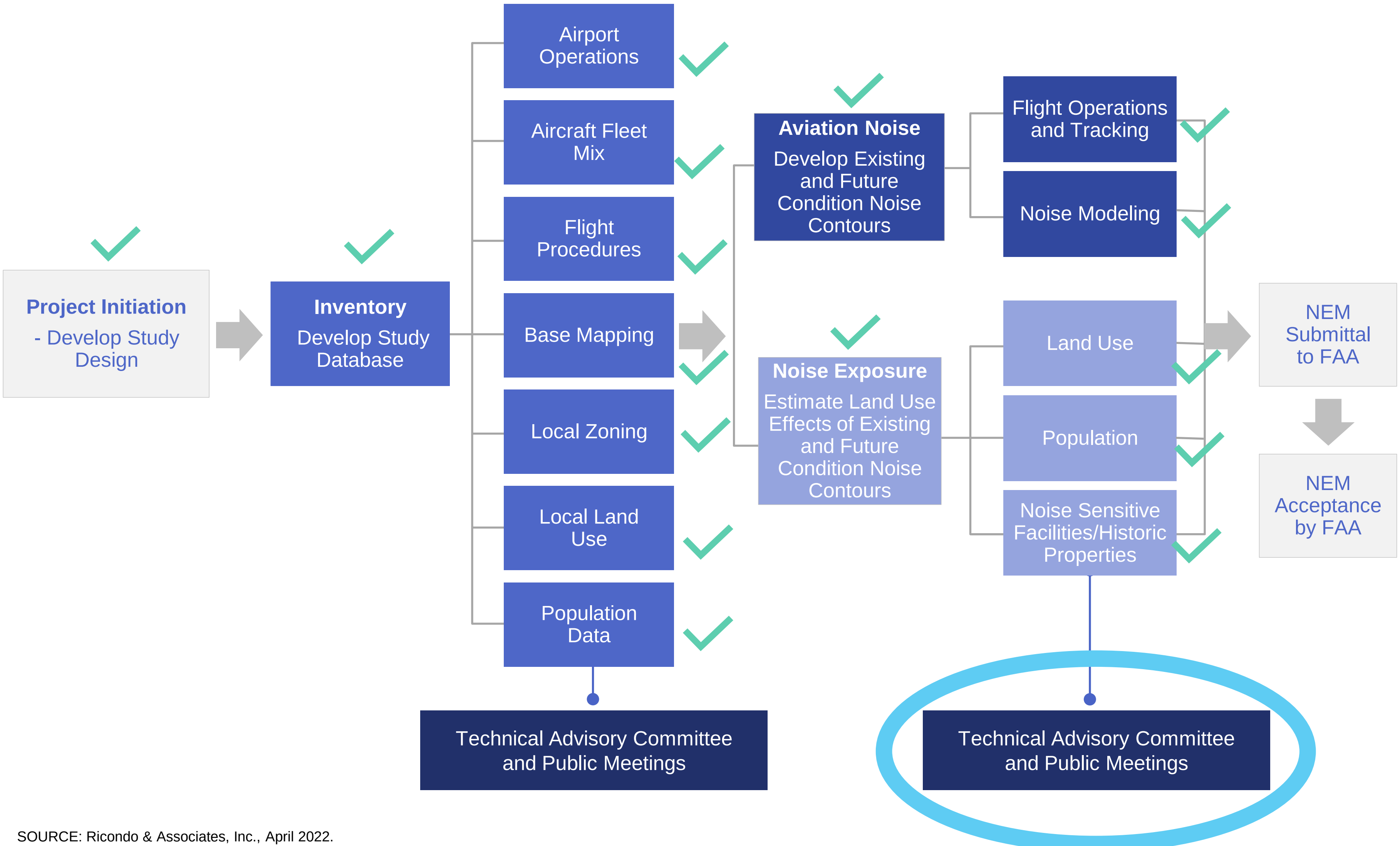
Title 14 CFR Part 150 Overview



SOURCE: Ricondo & Associates, Inc., April 2022.

Methodology Summary

Title 14 CFR Part 150 Overview – NEM Process



SOURCE: Ricondo & Associates, Inc., April 2022.

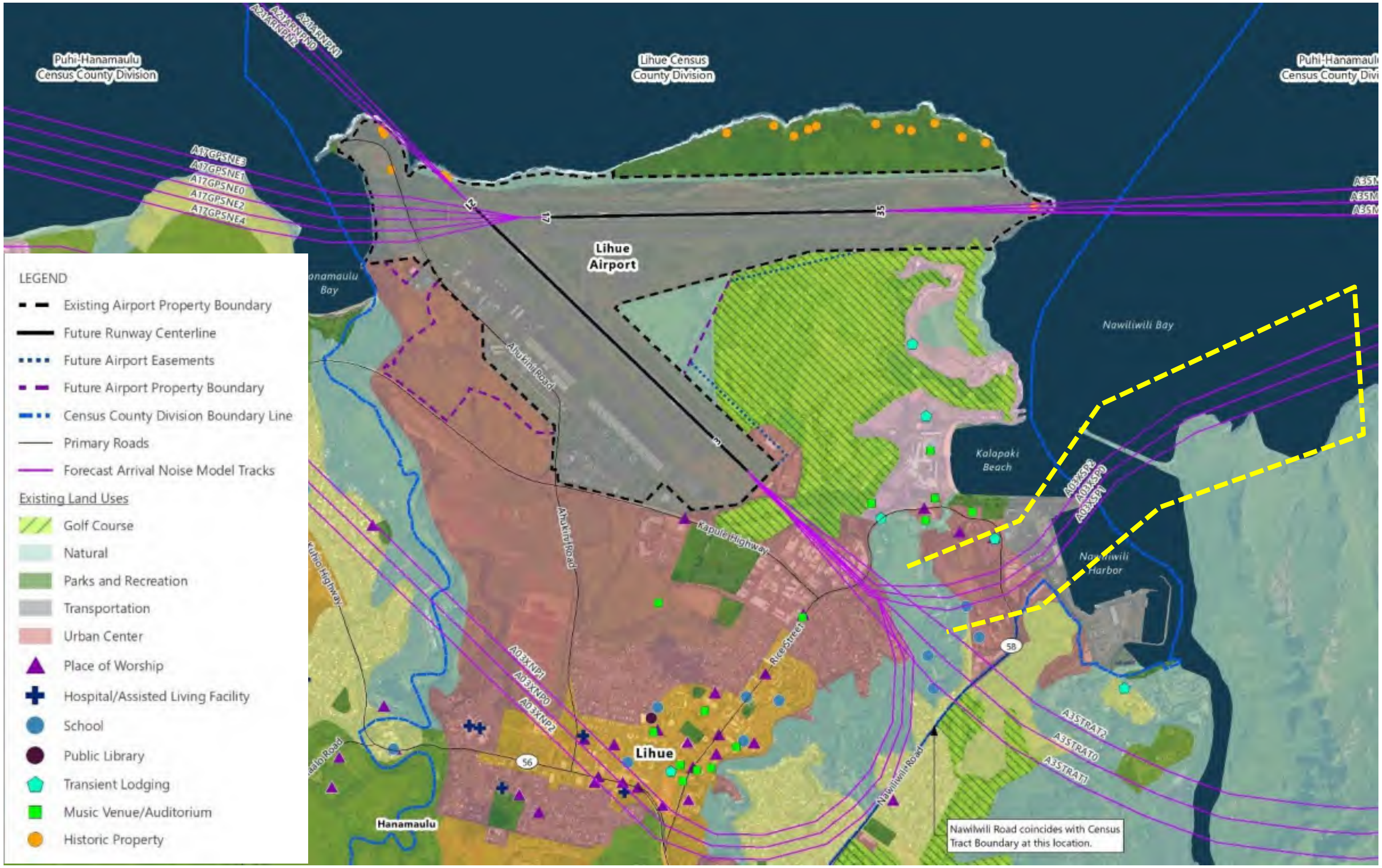
We Are Here

TAC Meeting #1 Comment

Fixed-Wing Arrival Noise Model Track to Runway 3

NORTH

Arrivals



SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022.

Land Use Compatibility Overview

Land Use Compatibility – FAA

Land use	Yearly day-night average sound level (Ldn) [DNL] in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail -- building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade – general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps.	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation.	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NLR: Noise Level Reduction

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Notes for Table 1

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Source: 14 CFR Part 150, Appendix A, Table 1. [Bracketed material and color added by Ricondo & Associates, Inc.]

Land Use Compatibility – State of Hawaii

LAND USE	YEARLY DAY-NIGHT NOISE LEVEL (DNL) IN DECIBELS					
	BELOW 60	60-65	65-70	70-75	75-80	80-85
Residential						
Low density residential, resorts, and hotels (outdoor facility)	Y(1)	N(2)	N	N	N	N
Low density apartment with moderate outdoor use	Y	N(2)	N	N	N	N
High density apartment with limited outdoor use	Y	N(2)	N(2)	N	N	N
Transient lodgings with limited outdoor use	Y	N(2)	N(2)	N	N	N
Public Use						
Schools, day-care centers, libraries, and churches	Y	N(3)	N(3)	N(3)	N	N
Hospitals, nursing homes, clinics, and health facilities	Y	Y(4)	Y(4)	Y(4)	N	N
Indoor auditoriums and concert halls	Y(3)	Y(3)	N	N	N	N
Governmental services and office buildings serving the general public	Y	Y	Y(4)	Y(4)	N	N
Transportation and parking	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Commercial Use and Government Use						
Offices – government, business ,and professional	Y	Y	Y(4)	Y(4)	N	N
Wholesale and retail--building materials, hardware, and heavy equipment	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Airport businesses – car rental, tours, lei stands, ticket offices, etc.	Y	Y	Y(4)	Y(4)	N	N
Retail, restaurants, shopping centers, financial institutions, etc.	Y	Y	Y(4)	Y(4)	N	N
Power plants, sewage treatment plants, and base yards	Y	Y	Y(4)	Y(4)	Y(4)	N
Studios without outdoor sets, broadcasting, production facilities, etc.	Y(3)	Y(3)	N	N	N	N
Manufacturing, Production, and Storage						
Manufacturing, general	Y	Y	Y(4)	Y(4)	Y(4)	N
Photographic and optical	Y	Y	Y(4)	Y(4)	N	N
Agriculture (except livestock) and forestry	Y	Y(5)	Y(5)	Y(5)	Y(5)	Y(5)
Livestock farming and breeding	Y	Y(5)	Y(5)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(6)	Y(6)	N	N	N
Outdoor music shells, amphitheaters	Y(6)	N	N	N	N	N
Nature exhibits and zoos, neighborhood parks	Y	Y	N	N	N	N
Amusements, beach parks, active playgrounds, etc.	Y	Y	Y	Y	N	N
Public golf courses, riding stables, cemeteries, gardens, etc.	Y	N	N	N	N	N
Professional/resort sport facilities, locations of media events, etc.	Y(6)	N	N	N	N	N
Extensive natural wildlife and recreation areas	Y(6)	N	N	N	N	N

Numbers in parentheses refer to notes

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NOTES:

Y – yes, land use and related structures are compatible without restrictions.

N – no, land use and related structures are not compatible and should be prohibited.

(1) A noise level 60 DNL does not eliminate all risks of adverse noise impacts from aircraft noise. However, the 60 DNL planning level has been selected by the Hawaii State Department of Transportation – Airports Division as an appropriate compromise between the minimal risk level of 55 DNL and significant risk level of 65 DNL.

(2) Where the community determines that these uses must be allowed, Noise Level Reduction (NLR) measures to achieve interior levels of 45 DNL or less should be incorporated into building codes and be considered in individual approvals. Normal local construction employing natural ventilation can be expected to provide an average NLR, and will not eliminate outdoor noise problems.

(3) Because of the DNL noise descriptor system represents a 24-hour average of individual aircraft noise events, each of which can be unique in respect to amplitude, duration, and tonal content, the NLR requirements should be evaluated for the specific land use, interior acoustical requirements, and properties of the aircraft noise events. NLR requirements should not be based solely upon the exterior DNL exposure level.

(4) Measures to achieve required NLR must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

(5) Residential buildings require NLR. Residential buildings should not be located where noise is greater than 65 DNL.

(6) Impact of amplitude, duration, frequency, and tonal content of aircraft noise events should be evaluated.

SOURCE: State of Hawaii Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Report*, April 2013.

Results

2019 Existing Condition NEM

2019 NEM – Incompatible Uses

- **FAA Guidelines**
  - Golf Course – 10 acres in DNL 70+ dBA contour (no indoor facilities in area)
  - Natural Land – 24 acres in DNL 70+ dBA contour
- **State of Hawaii Guidelines**
  - Golf Course – 132 acres in DNL 60+ dBA contour
  - Resort – 4 acres in DNL 60+ dBA contour (includes structures associated with Kauai Lagoons Marina at Marriott's Kauai Lagoons Kalanipuʻu)
  - Natural Land – 94 acres in DNL 60+ dBA contour
  - 1 Place of Worship in DNL 60+ dBA contour

2027 Forecast Conditions NEM

2027 NEM – Incompatible Uses

- **FAA Guidelines**
  - Golf Course – 12 acres in DNL 70+ dBA contour (no indoor facilities in area)
  - Natural Land – 23 acres in DNL 70+ dBA contour
- **State of Hawaii Guidelines**
  - 6 residential units in DNL 60+ dBA contour (approximately 18 residents)
  - 1 place of worship in DNL 60+ dBA contour
  - Golf Course – 184 acres in DNL 60+ dBA contour
  - Resort – 8 acres in DNL 60+ dBA contour (includes structures associated with Kauai Lagoons Marina at Marriott's Kauai Lagoons Kalanipu'u)
  - Natural Land – 103 acres in DNL 60+ dBA contour

2019 and 2027 NEM – Historic Properties Located in the DNL 60+ dBA Noise Contour

STATE INVENTORY OF HISTORICS PLACES NUMBER	SITE TYPE	FUNCTION	DESCRIPTION	LOCATED WITHIN NOISE EXPOSURE CONTOUR	LAND USE DESIGNATION	LAND USE COMPATIBILITY PER FAA GUIDELINES	LAND USE COMPATIBILITY PER STATE OF HAWAII GUIDELINES
50-30-11-2087	Nawiliwili Harbor Light, Wall Remnants, and Building Foundations	Lighthouse and Associated Remnants of Caretaker's Quarters	Series of features interpreted as being associated with Nawiliwili Harbor Light	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2096	Ditch	Drainage	Concrete drainage ditch	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2097	Ditch	Drainage	Concrete drainage ditch	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2103	Structural Foundations	Industrial Complex	Remnants of five foundations associated with a historic industrial complex present near Ahukini Landing	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-08-3958	Enclosures and Related Structures	Animal Husbandry	Piggery dating from the plantation era	DNL 70 dBA	Natural	Incompatible [1]	Incompatible [2]
	Enclosures and Related Structures	Animal Husbandry	Piggery dating from the plantation era	DNL 70 dBA	Natural	Incompatible [1]	Incompatible [2]

NOTES:

Historic properties are those that are listed in or eligible for listing in the National Register of Historic Places.

1 Although a historic property may be located in an area that is considered incompatible by FAA guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places. Natural land uses are most closely related to "Nature exhibits and zoos" in Title 14 Code of Federal Regulations Part 150 land use compatibility guidelines. Per FAA guidelines, these uses are considered incompatible at DNL 70 dBA and higher.

2 Although a historic property may be located in an area that is considered incompatible by the State of Hawaii recommended guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places. Natural land uses are most closely related to "Nature exhibits and zoos, neighborhood parks" and "Extensive natural wildlife and recreation areas" in State of Hawaii land use compatibility guidelines. Per State of Hawaii guidelines, these uses are considered incompatible at DNL 70 dBA and higher.

dBA – A-Weighted Decibels

DNL – Day-Night Average Sound Level

FAA – Federal Aviation Administration

SOURCES: Monahan, Chris, Ph.D., and Hallett H. Hammatt, Ph.D., *Archaeological Literature Review and Field Inspection Report for the Nawiliwili-Ahukini Bike Path Project, Nawiliwili, Kalapaki and Hanama'ulu Ahupua'a, Lihu'e District, Kaua'I Island*, July 2008; Wilson Okamoto Corporation and State of Hawaii Department of Transportation – Airports Division, *Final Environmental Impact Statement, Lihue Airport Improvements*, November 2007; Appendix A of this Study.

2019 and 2027 NEM – Supplemental Information

- Plot of the DNL 55 dBA contour is for informational purposes only
- All uses between the DNL 55 and 60 dBA noise contours are considered compatible by FAA and State of Hawaii guidelines
- State of Hawaii requires use of the DNL 55 dBA as a property buyer notification boundary

2019: 994 acres within the DNL 55 dBA contour area

2027: 1,141 acres within the DNL 55 dBA contour area

Next Steps

Next Steps

- Conduct public workshop on May 5, 2022
- Receive comments on Draft NEM Update Report up to May 16, 2022
- Finalize Draft NEM Update Report
- Submit Draft NEM Update Report to FAA for Review and Acceptance

Questions and Answers Session

APPENDIX D

Public Involvement

D.1 | PUBLIC MEETING #1 PRESENTATION

D.2 | PUBLIC MEETING #1 LEGAL ADVERTISEMENT AND AFFIDAVIT OF PUBLICATION

D.3 | PUBLIC MEETING #1 COMMENTS RECEIVED

D.4 | PUBLIC MEETING #1 WEBSITE ANNOUNCEMENT

D.5 | PUBLIC MEETING #2 PRESENTATION

D.6 | PUBLIC MEETING #2 LEGAL ADVERTISEMENT AND AFFIDAVIT OF PUBLICATION

D.7 | PUBLIC MEETING #2 COMMENTS RECEIVED

D.8 | PUBLIC MEETING #2 WEBSITE ANNOUNCEMENT

APPENDIX D.1

Public Meeting #1 Presentation

Lihue Airport Noise Exposure Map Update

Public Information Meeting #1

October 26, 2021

Welcome

- Introduction by Herman Tuilosega, Hawaii Department of Transportation, Airports, Planning Division Section Head
- Opening Remarks by Ross Higashi, Hawaii Department of Transportation, Airports, Deputy Director of Airports
- Follow up remarks by Ura Yvan, Ricondo & Associates, Inc. – Meeting Moderator

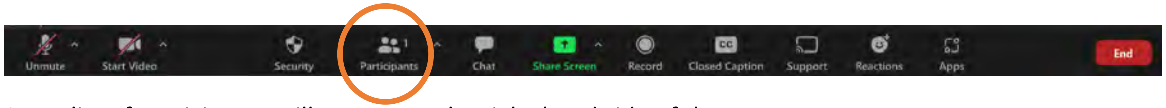
Project Team

- State of Hawaii Department of Transportation – Airports Division (DOT-A)
  - Sponsor of the Part 150 Noise Exposure Map (NEM) Update Study
  - State Project Manager: Mr. Raymond Severn
- Consultant Team
  - Ricondo & Associates, Inc. leading the Part 150 NEM Update Study
  - 30+ years of airport planning and operations and aircraft noise analysis experience
  - Project Principal: Mr. John Williams

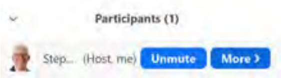
Zoom Protocol

- Welcome
  - Update your Name
    1. First and Last Name
    2. Ex: Raymond Severn
  - Names to be used to identify commenters

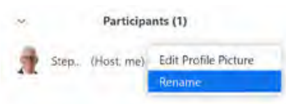
1. At the bottom of the screen in Zoom, click on the “Participants” icon.



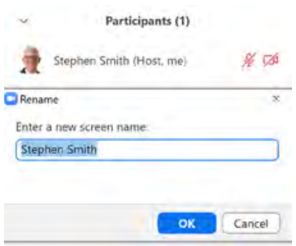
2. A list of participants will appear on the right-hand side of the Zoom room. Hover over your name and click the “More” button.



3. Click the “Rename” option



4. Enter your name in the “Enter a new screen name” field. If available on the screen, make sure to uncheck “Remember my name for future meetings” if you wish not to carry the changes forward for future Zoom meetings.



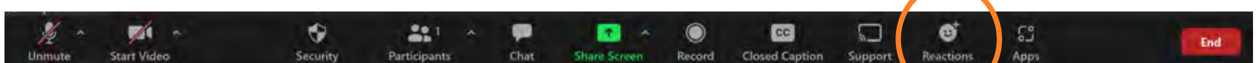
Note: some users may have a different version of Zoom with different locations of commands, but the participant symbology should be the same.

Zoom Protocol

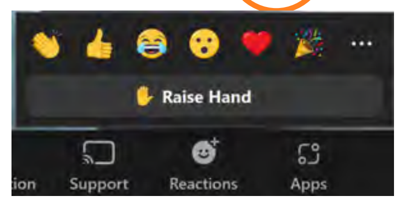
- Commenting
  - All participants will be muted by the moderator
  - Moderator will call on participants who:

1. Raise hand physically (if video is on)
2. Raise hand virtually (hand feature)

Hand feature: select “Reactions” icon then



Select “Raise Hand” button



3. Comment in chat

4. Send an email to uyvan@ricondo.com (if none of these features work and you are a committee member with a question or comment)

Agenda

1. Title 14 CFR Part 150 Overview
2. Roles in NEM Update
3. Understanding Noise and Sound Level Metrics
4. Operations Forecast and Study Years
5. Noise Modeling Methodology and Inputs
6. Land Use Compatibility
7. Public Involvement Plan
8. Next Steps
9. Q&A Session

Title 14 Code of Federal Regulations (CFR) Part 150 Overview

Title 14 CFR Part 150 Overview

- Sets forth the regulations and guidelines for airport sponsors to undertake noise compatibility planning
- Establishes the methodology for preparing aircraft noise exposure maps and developing aircraft noise and land use compatibility programs
- 14 CFR Part 150 studies are voluntary and must abide by 14 CFR Part 150 guidelines to be accepted by FAA

Title 14 CFR Part 150 Overview – History

- Promulgated by the FAA pursuant to the Aviation Safety and Noise Abatement Act (ASNA) of 1979, Public Law 96-193

- In 1981, an Interim Rule on Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning* was issued

- FAR Part 150 finalized in 1985

- Recodified as Title 14 Code of Federal Regulations (CFR) Part 150

- Part 150 studies must adhere to 14 CFR Part 150 guidelines for noise exposure maps to be accepted, and noise compatibility programs to be approved by FAA

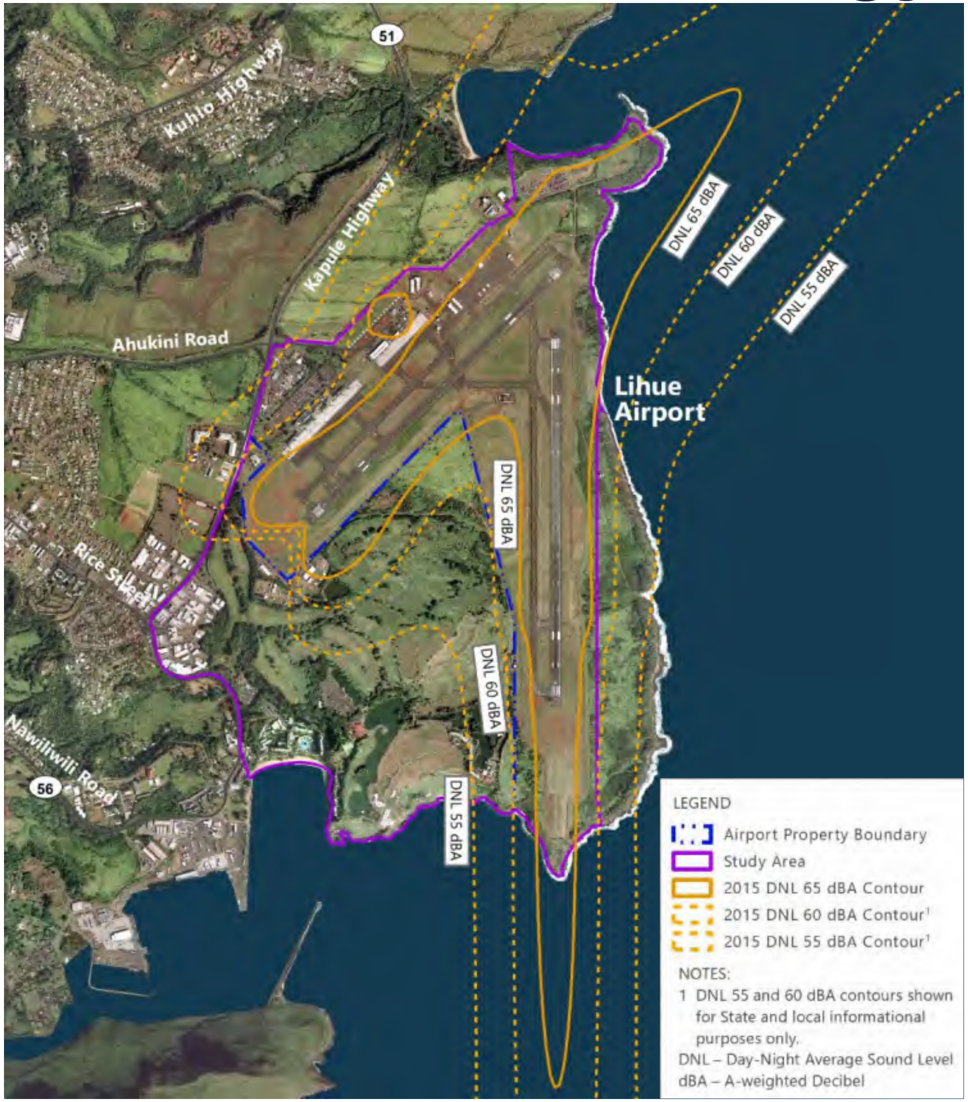
Title 14 CFR Part 150 Overview – Parts

- A Title 14 CFR Part 150 Study identifies and evaluates two components – existing and future:
  - aircraft noise
  - land use
- Consists of two distinct but complementary portions:
  - Noise Exposure Maps (NEM)
  - Noise Compatibility Program (NCP)
- The Lihue Airport Title 14 CFR Part 150 NEM Update:
  - **Will** update existing and future aircraft noise and
  - **Will** reflect existing and future land use conditions
  - **Will not** update the Noise Compatibility Program

Title 14 CFR 150 Overview - Terminology

Aircraft Noise Contour (contour):

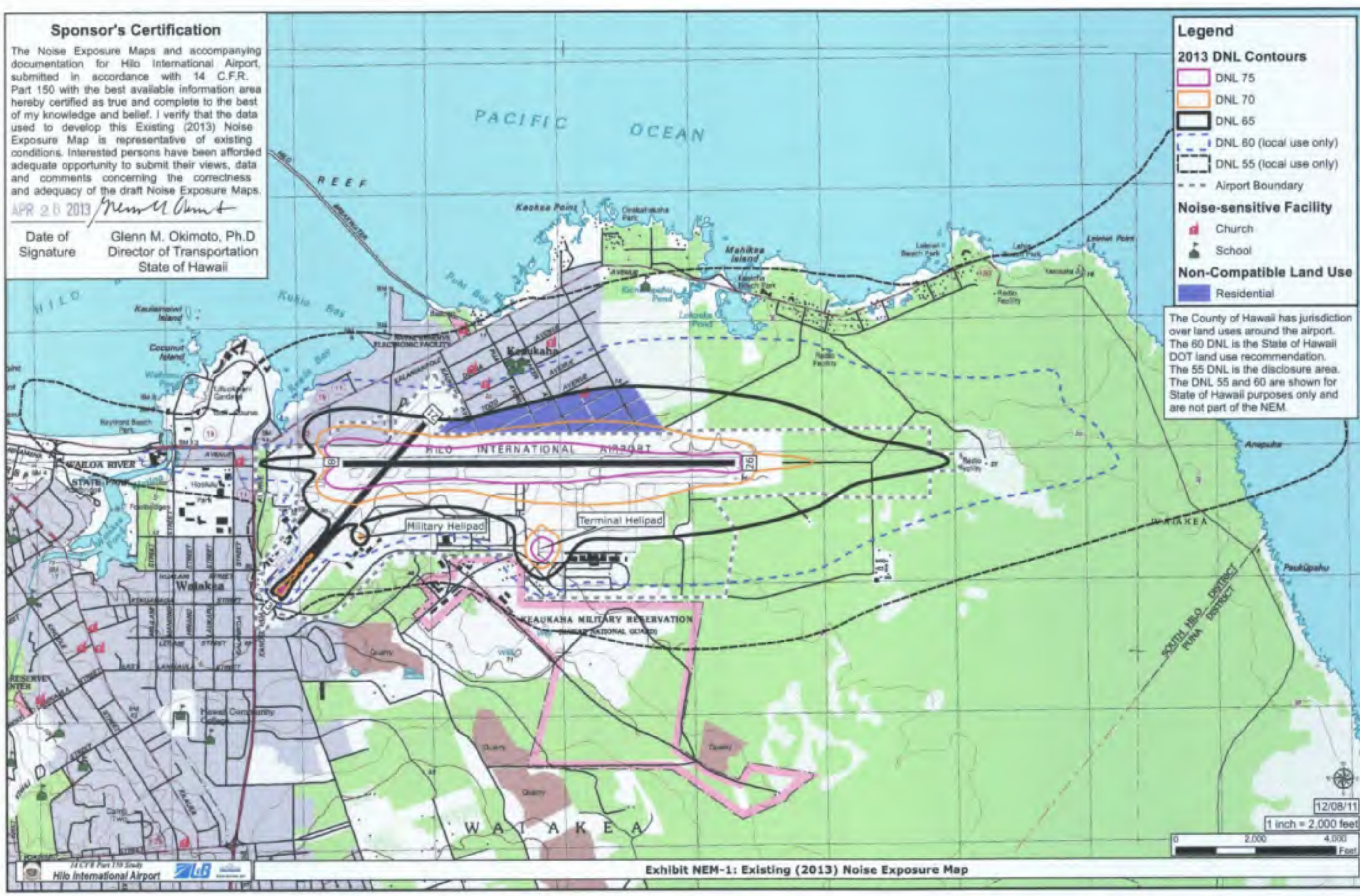
Lines connecting points of equal noise exposure level



SOURCE: Ricondo & Associates, Inc., *Lihue Airport Runway 3-21 Runway Safety Area Improvements Final Environmental Assessment,* March 2018.

Title 14 CFR 150 Overview - Terminology

Noise Exposure Map (NEM) - Provides information on the existing and future expected areas exposed to various levels of aircraft noise around an airport.

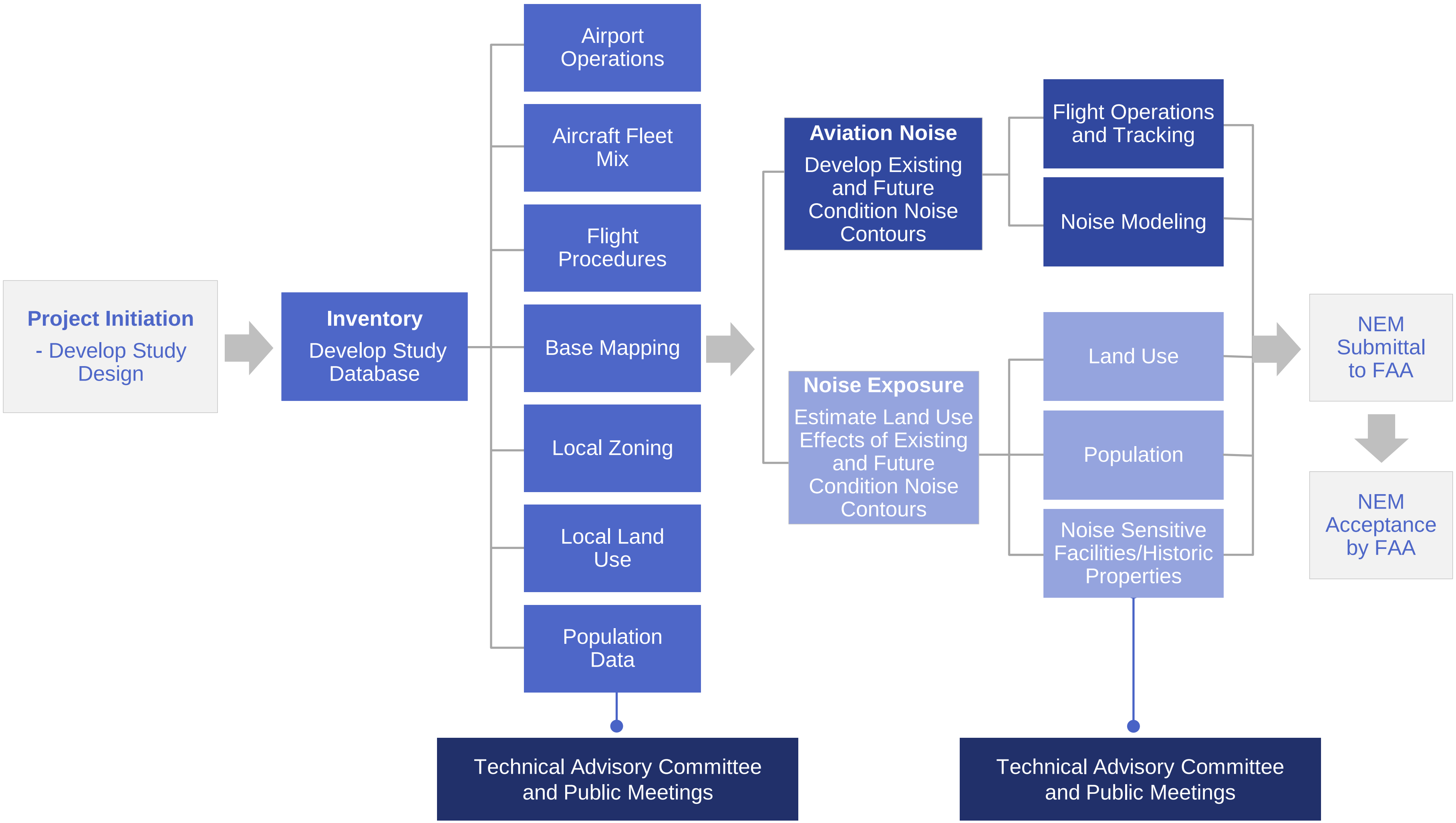


SOURCE: Hawaii Department of Transportation - Airports Division, *Hilo International Airport: FAR Part 150 Noise Exposure Map Update,* April 2013.

Title 14 CFR 150 Overview – NEM Update

- Determine existing and future noise conditions in the vicinity of the Airport due to changes since previous FAA-accepted NEM in:
  - Operations
  - Aircraft used by operators
  - Airfield (i.e., LIH Runway 3-21 runway safety area improvements)
  - Incompatible land use
- Method:
  - Conduct an update to the Noise Exposure Maps (NEMs) for existing and future conditions
  - Consult stakeholders and provide general public opportunity to comment on update

Title 14 CFR Part 150 Overview – NEM Process



SOURCE: Ricondo & Associates, Inc., October 2021.

Title 14 CFR Part 150 Overview – Regulatory Framework

- **Federal law** establishes aircraft noise standards, operating rules, compatibility planning process, and limitations on the airport owner's capability to restrict aircraft operations.

- **State law** establishes compatibility planning guidelines and noise standards except for aircraft.

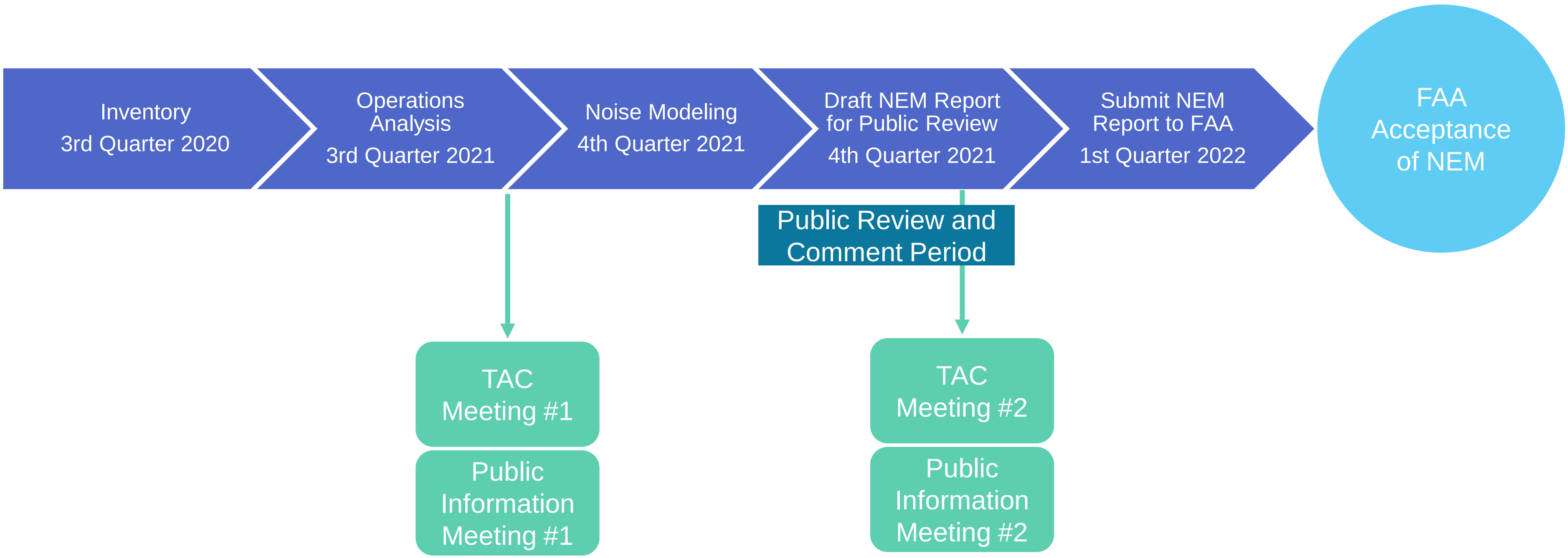
- **Local noise ordinances** establishes noise standards and compatible land use planning except for aircraft.

Title 14 CFR Part 150 Overview – Who Can Regulate Airport Noise?

- **Federal Aviation Administration (FAA):**
  - Controls aircraft in flight
  - Regulates aircraft noise at its source (i.e., aircraft engines)
  - Grants aircraft and pilot certification
- **State of Hawaii Department of Transportation – Airports Division (DOT-A) :**
  - Does not have authority to restrict aircraft operations
  - Manages capital improvement projects and infrastructure
  - Has the authority to adopt local land use guidelines with limitations
- **Local Government**:
  - Does not have authority to restrict aircraft operations
  - Enforces compatible land use through zoning
  - Mandates use of sound-insulating building materials
  - Implements real estate disclosure

Federal law preempts state and local regulations.

Title 14 CFR Part 150 Overview – Schedule



SOURCE: Ricondo & Associates, Inc., October 2021.

Roles in NEM Update

Roles

- **FAA**
  - Approve any customization to aircraft noise model input
  - Approve operations forecast
  - Review and accept the NEM
- **DOT-A**
  - Sponsor the NEM Update
  - Certify accuracy of the NEM
  - Coordinate with agencies and interested parties
- **Consultant Team**
  - Conduct NEM analysis and prepare documentation
  - Support consultation and public information outreach

Roles (continued)

- **Technical Advisory Committee (TAC)**
  - Provide input and insight on technical issues associated with certain aspects of aviation, airport operations, and land use
- **Public**
  - Review and comment on NEM methodology, existing and forecast airport specific aircraft operations, and aircraft noise concerns

Understanding Noise and Sound Level Metrics

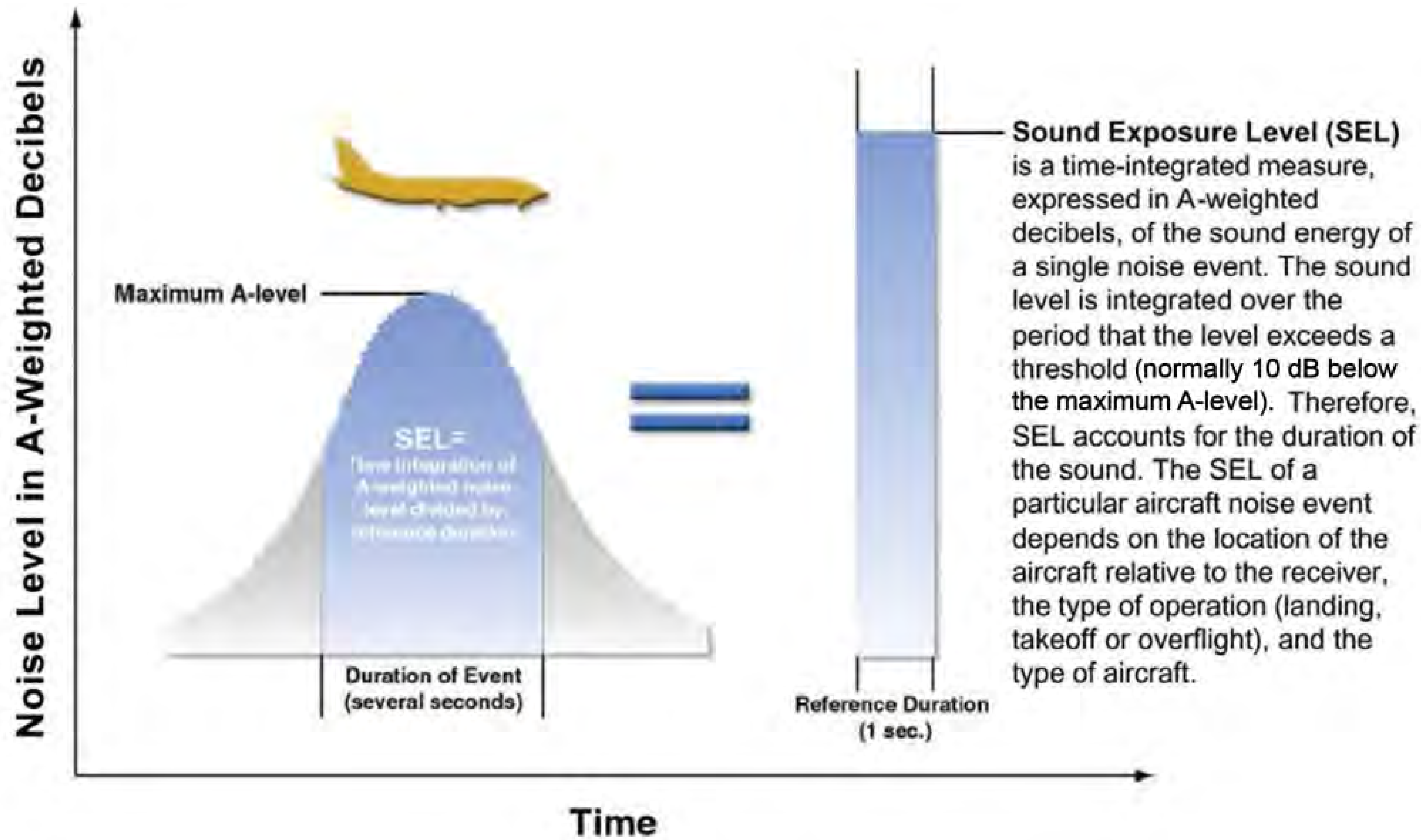
Understanding Noise and Sound Level Metrics

- As required by FAA, airport noise assessments are based on annual Day-Night Average Sound Level (DNL) noise metric
- DNL is expressed in A-weighted decibels (dBA) – focuses on the sound frequencies that are detectible by the human ear
- DNL represents the cumulative effects of all aircraft operations occurring during an average 24-hour period
- Calculated based on an “annual average day” derived from aircraft operations data for an entire calendar year
- In the calculation of DNL, noise events occurring during the nighttime hours (10:00 p.m. to 7:00 a.m.) are increased by a 10-decibel weighting to represent the increased sensitivity of people to noise that occurs at night

Nighttime Penalty Effect:
1 nighttime operation is equivalent to 10 daytime operations

Understanding Noise and Sound Level Metrics

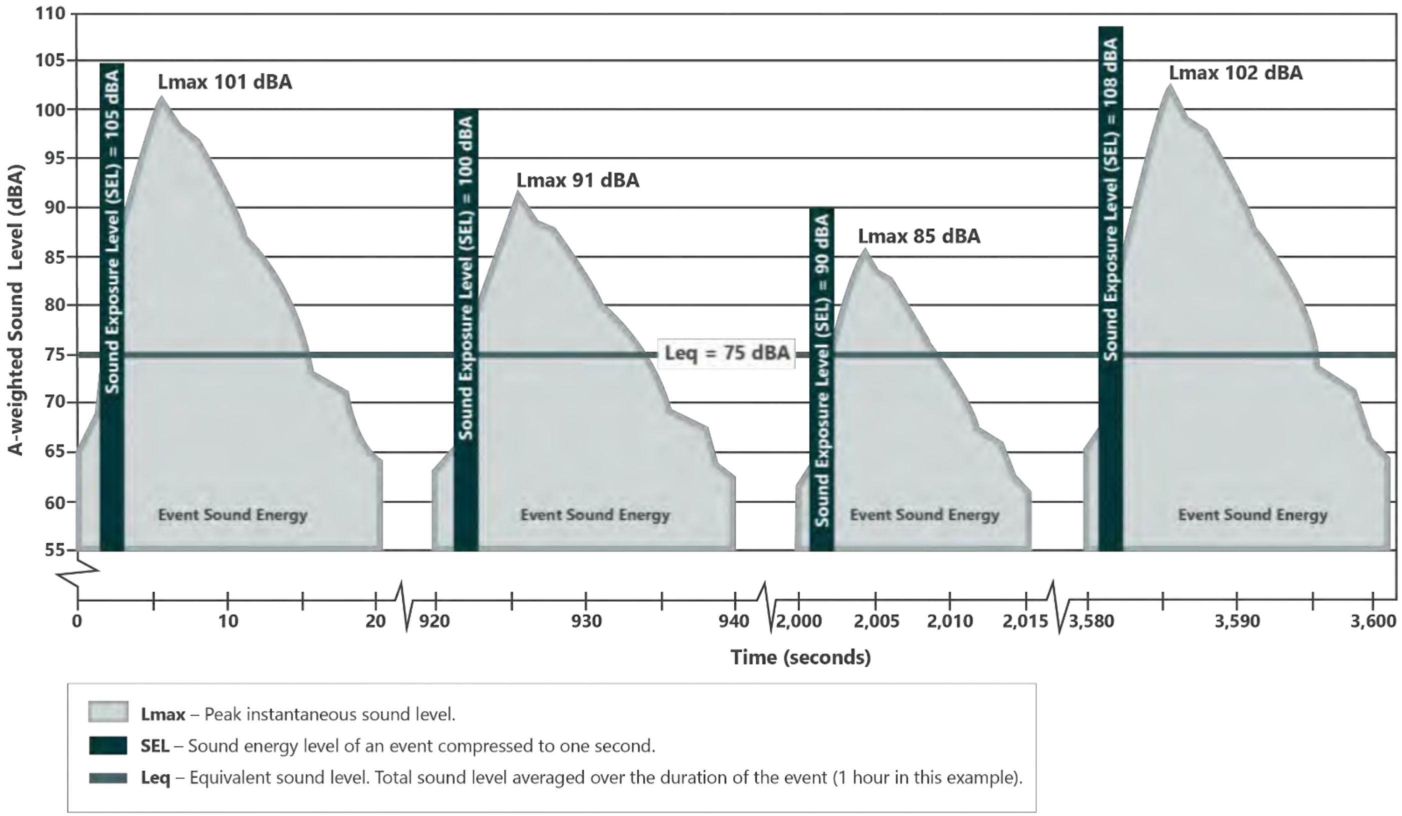
- Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL)



SOURCE: Brown-Buntin Associates, November 2008

Understanding Noise and Sound Level Metrics

- Lmax, SEL and Average Sound Level (L_{eq})



Four aircraft overflights occur during a one-hour period.

The peak sound levels (Lmax) range from 85 dBA to 102 dBA.

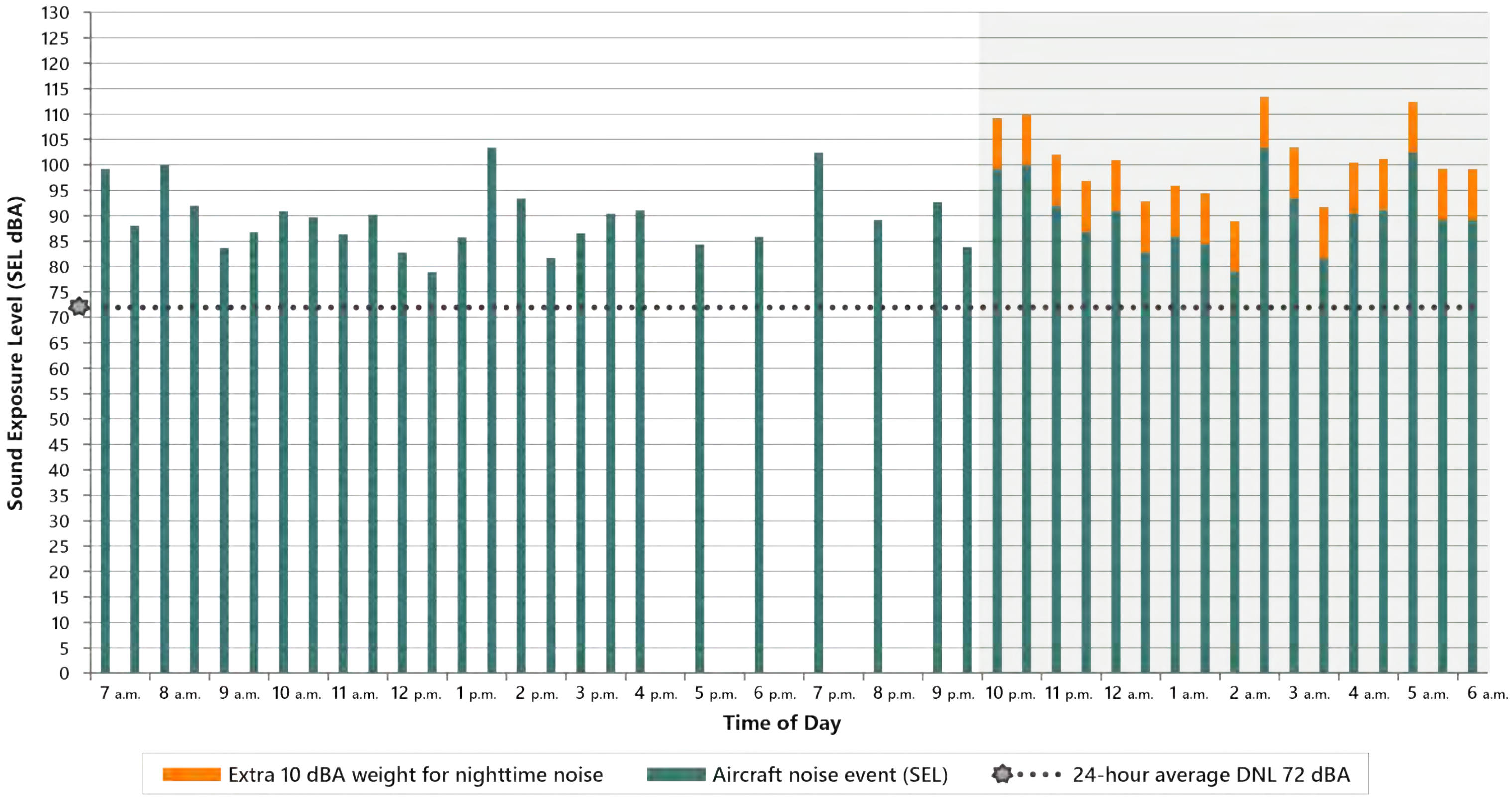
The total sound energy of the events (SEL) range from 90 dBA to 108 dBA.

The cumulative sound level during the hour (Leq) is 75 dBA – the same as a steady sound of 75 dBA throughout the entire hour.

SOURCE: Airport Cooperative Research Program (ACRP), *ACRP Report 15: Aircraft Noise: A Toolkit for Managing Community Expectations* (Figure 6-2, p. 115), 2009; Ricondo & Associates, Inc., October 2021 (updated figure 6-2).

Understanding Noise and Sound Level Metrics

Day-Night Average Sound Level (DNL)



DNL is the metric (or descriptor) that the FAA and the U.S. Department of Defense use to describe the noise environment around civilian and military airports. DNL represents the total, time-weighted noise occurring during a 24-hour period. Noise events after 10:00 p.m. and before 7:00 a.m. are assigned an extra 10 decibels (dBA) in the DNL calculation to reflect the increased sensitivity of people to nighttime noise. For Part 150 studies, the DNL levels are calculated for an "average day" during the study year.

In this example, 42 aircraft noise events occur during the 24-hour period – 25 in daytime and 17 in nighttime hours. The noise levels of the events range from 78 dBA to 103 dBA. The extra 10 dBA assigned to the nighttime events gives them noise levels as high as 113 dBA. The cumulative aircraft noise level for the 24-hour period is DNL 72 dBA, a very high noise level that many people would consider to be annoying at home.

SOURCE: Ricondo & Associates, Inc., October 2021.

Operations Forecast and Study Years

Operations Forecast – Summary

- Based on the Master Plan Update forecast analysis, which was approved by the FAA on September 30, 2020
- Based on 2018 annual aircraft operations and forecast trends prior to COVID-19 Pandemic
- Applied to develop the aircraft activity levels for the future year NEM that represents “at least 5 years” from the year when the NEM Update report is submitted to FAA

SOURCE: Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020

Operations Forecast – COVID-19 Pandemic

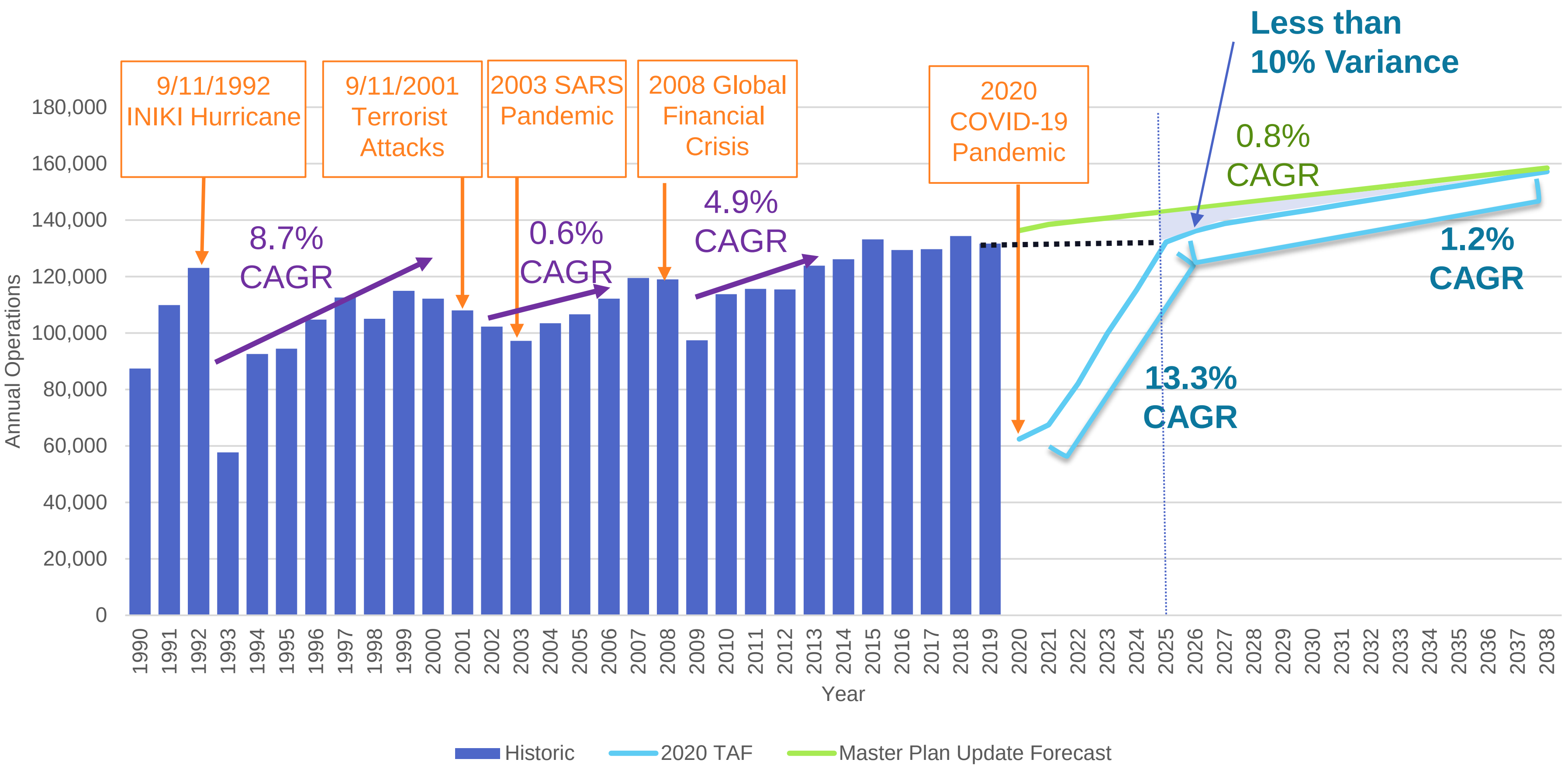
- Considered uncertainties related to the severity and duration of impact remain

- Compared to the 2020 FAA Terminal Area Forecast (TAF)
  - Focus on forecasting the near-term recovery back to 2019 activity
  - Return to 2019 levels in 2025 – a 13.3% compound annual growth rate
  - Master Plan forecast 2027 levels forecast for 2031 in TAF
  - Variance between Master Plan forecast and 2020 TAF less than 10% after recovery to 2019 levels

- Master Plan forecast 2027 levels represent activity levels “at least five years” from expected NEM Update Report submittal to FAA

SOURCE: Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020.

Operations Forecast – COVID-19 Pandemic



NOTE: TAF – Terminal Area Forecast; CAGR – Compound Annual Growth Rate; TAF operations based on federal fiscal year (October to September)
SOURCES: Federal Aviation Administration, 2019 Terminal Area Forecast, February 2020 (historic Federal fiscal year operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020 (Master Plan Update forecast operations, compound annual growth rates and TAF variance to Master Plan forecast from 2025 to 2038).

Study Years

- **2019**
  - Operations have temporarily dropped due to COVID-19 pandemic
  - High short-term growth rate to return to 2019 levels - faster than normal growth rates
    - 2020 to 2025 Master Plan forecast CAGR: 0.8%
    - 2020 to 2025 2020 TAF CAGR: 13.3%
  - 2020 and 2021 are within recovery period and does not represent a reasonable representation of existing conditions
  - Recovery to 2019 operations levels expected to occur within the five-year planning horizon
  - 2019 selected as reasonable representation of existing conditions after recovery from COVID-19 pandemic impacts

- **2027**
  - Master Plan 2027 forecast levels could be reached between 2027 and 2031
  - Forecast operations “at least five years” from submittal of NEM Update to FAA

Forecast – Operations Counts

- Annual Aircraft Itinerant Operations - operations that land at an airport, arriving from outside the airport area, or departs an airport and leaves the airport area

USER CATEGORY	DEFINITION	2019 ACTUAL[1]	2027 FORECAST[2]
Air Carrier	An aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds carrying passengers or cargo for hire or compensation.	27,246	33,919
Air Taxi	An aircraft designed to have a maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less carrying passengers or cargo for hire or compensation.	77,982	86,246
General Aviation	All civil aircraft, except those classified as air carriers or air taxis.	5,868	6,436
Military	All classes of military takeoffs and landings at FAA and FTC facilities.	1,677	1,797
Total	**---**	**112,773**	**128,398**

NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: Federal Aviation Administration, https://aspm.faa.gov/aspmhelp/index/Glossary.html, (accessed October 7, 2021); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Update - Aviation Activity Forecasts*, March 2020.

Forecast – Operations Counts (continued)

- Annual Aircraft Local Operations - operations that remain in the local traffic pattern

USER CATEGORY	2019 ACTUAL[1]	2027 FORECAST[2]
General Aviation	13,572	16,558
Military	488	421
Total	**14,060**	**16,979**

NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: Federal Aviation Administration, https://aspm.faa.gov/aspmhelp/index/Glossary.html, (accessed October 7, 2021); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Update - Aviation Activity Forecasts*, March 2020.

- Annual Total Operations

2019 ACTUAL[1]	2027 FORECAST[2]
126,833	**145,377**

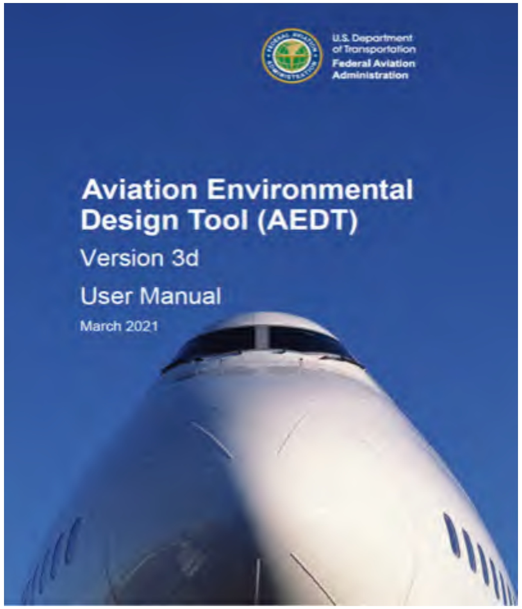
NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: Federal Aviation Administration, https://aspm.faa.gov/aspmhelp/index/Glossary.html, (accessed October 7, 2021); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Update - Aviation Activity Forecasts*, March 2020.

Noise Modeling Methodology and Inputs

Noise Model Methodology – Overview

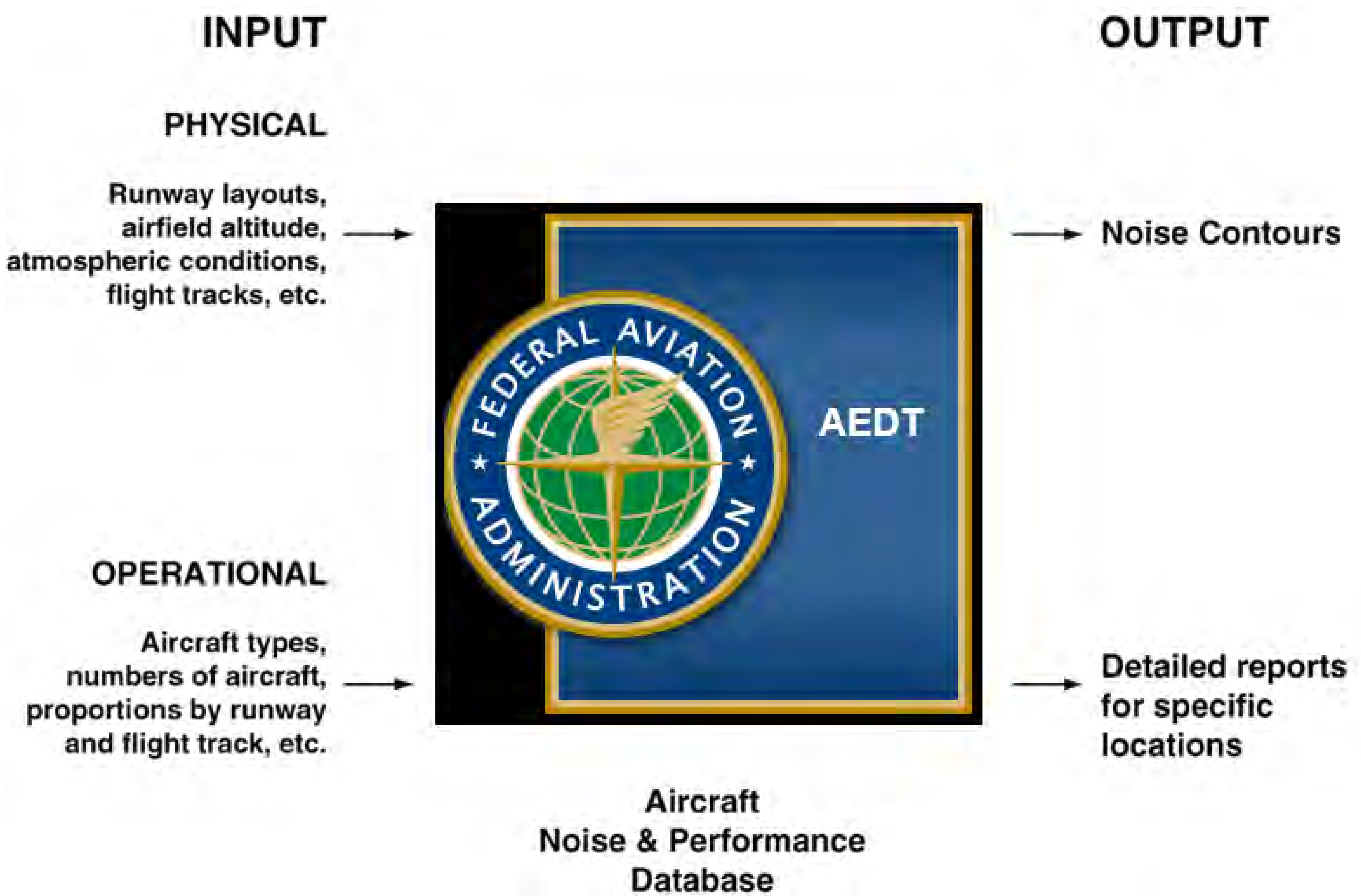
- Aircraft noise modeling allows:
  - Calculation of aircraft noise exposure at any location
  - Illustration of annual average aircraft noise exposure
  - Forecast of future aircraft noise exposure
  - Evaluation of changes in noise impacts due to changes in runway configuration or use
  - Evaluation of changes in aircraft fleet mix and/or number of operations
  - Assessment of operational procedures

- Aviation Environmental Design Tool (AEDT) replaced the Integrated Noise Model (INM) when it was released in 2015. The current version, AEDT 3d, is being used for this 14 CFR Part 150 NEM Update study.



SOURCE: Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT): Version 3d Technical Manual,* March 2021.

Noise Model Methodology – How it Works



SOURCE: Federal Aviation Administration

Noise Model Methodology - Inputs

- Inputs affecting the size of the contour include:
  - Operation Levels – User input
  - Aircraft Fleet Mix – User input based on AEDT aircraft database
  - Time of Day Distribution – User input
  - Aircraft Performance Characteristics – AEDT or FAA-approved user defined data
- Inputs affecting the shape of the contour/distribution of noise exposure include:
  - Runway Use – User input
  - Flight Track Locations and Use – User input

Average Annual Itinerant Operations & Time of Day

- **Itinerant – operations that land at an airport, arriving from outside the airport area, or departs an airport and leaves the airport area**

- **Existing – 2019 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**TOTAL**
Heavy Jet [1]	3.24	0.09	3.34	2.78	0.56	3.34	**6.67**
Large and Small Jets [2 3]	35.07	9.06	44.14	35.27	8.87	44.14	**88.27**
Piston/Turboprop	13.63	5.86	19.49	13.70	5.80	19.49	**38.99**
Military	1.72	0.57	2.29	1.97	0.32	2.29	**4.59**
Helicopter	82.73	2.50	85.22	82.73	2.50	85.22	**170.45**
TOTAL ITINERANT OPERATIONS [6]	**136.39**	**18.09**	**154.48**	**136.44**	**18.04**	**154.48**	**308.97**

- **Future – 2027 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**TOTAL**
Heavy Jet [1]	1.86	0.14	2.00	1.63	0.37	2.00	**4.00**
Large and Small Jets [2 3]	44.32	11.33	55.65	44.68	10.98	55.66	**111.31**
Piston/Turboprop	15.34	7.27	22.61	15.41	7.20	22.61	**45.22**
Military	1.85	0.62	2.46	2.12	0.34	2.46	**4.92**
Helicopter	90.43	2.73	93.16	90.43	2.73	93.16	**186.32**
TOTAL ITINERANT OPERATIONS	**153.79**	**22.10**	**175.88**	**154.26**	**21.63**	**175.89**	**351.78**

NOTES:

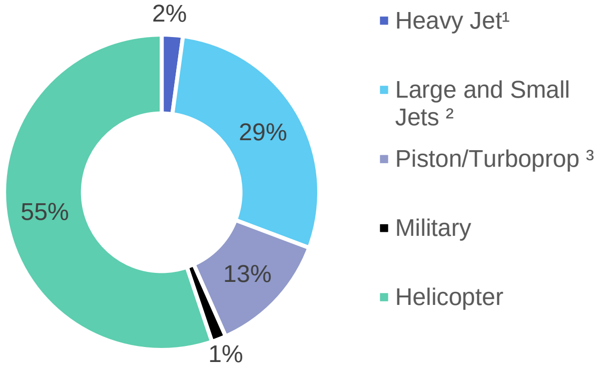
1 Heavy Jet - Aircraft weighing more than 255,000 pounds
2 Large Jet - Aircraft weighing more than 41,000 and up to 255,000 pounds
3 Small Jet – Aircraft weighing less than 41,000 pounds
4 Day = 7:00 a.m. to 9:59 p.m.
5 Night = 10:00 p.m. to 6:59 a.m.
6 Totals may not add due to rounding.

SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

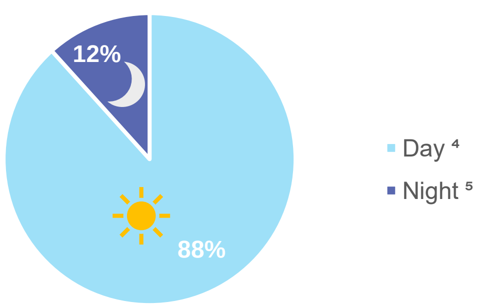
Average Annual Itinerant Operations & Time of Day

Existing – 2019 DRAFT

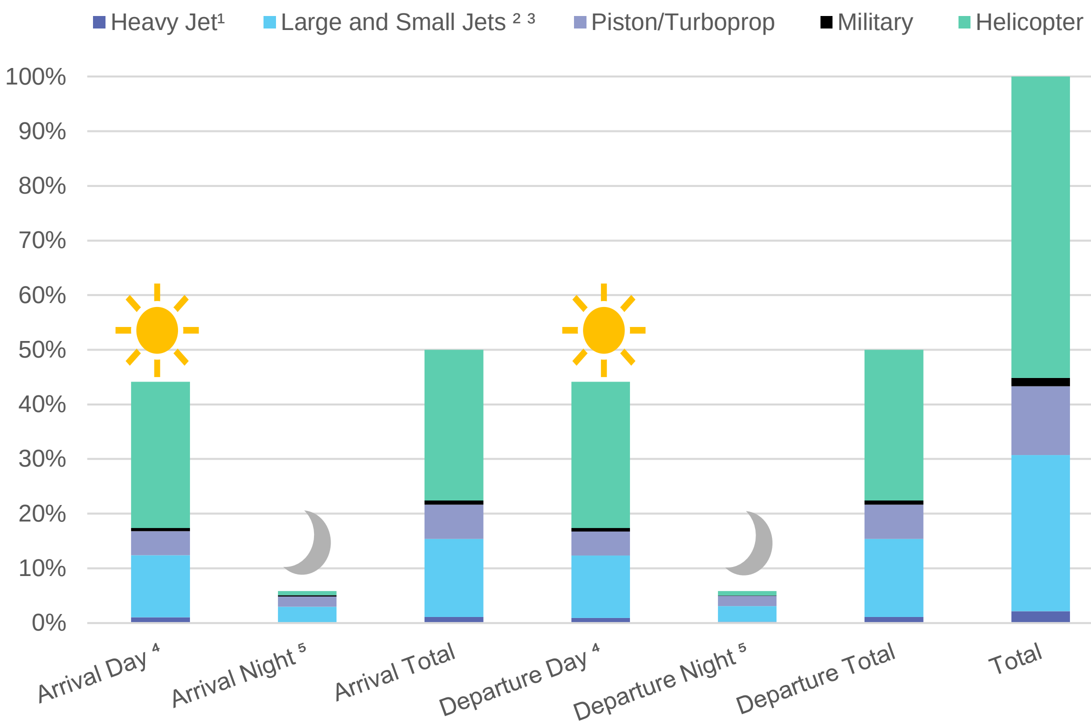
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



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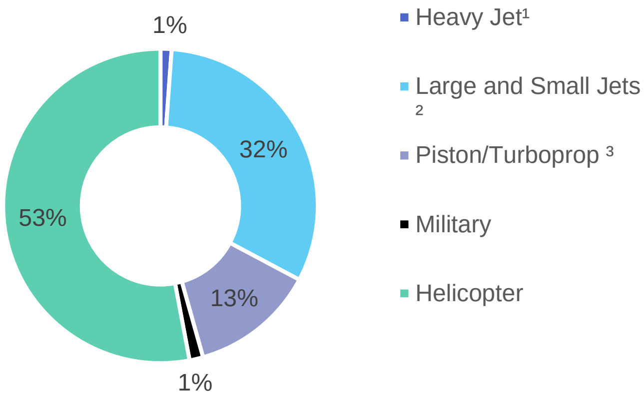
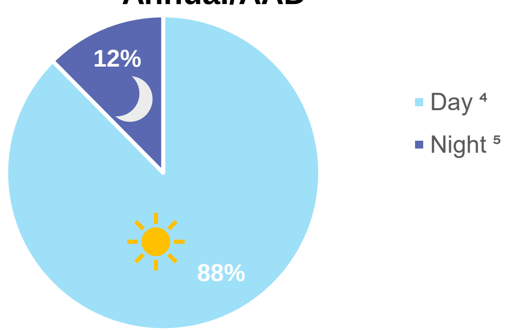
Average Annual Itinerant Operations & Time of Day

Future – 2027 DRAFT

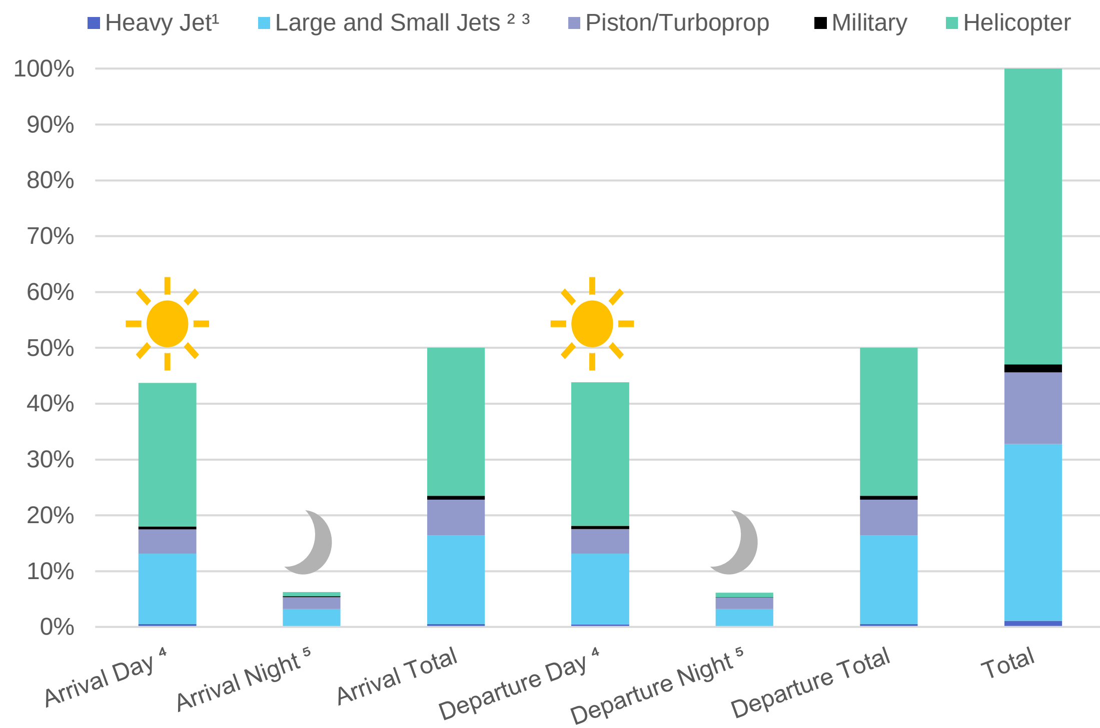
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



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Average Annual Local Operations & Time of Day

- **Local – operations that remain in the local traffic pattern**
- **Existing – 2019 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [3]	NIGHT [4]	TOTAL	DAY [3]	NIGHT [4]	TOTAL	**TOTAL**
General Aviation Jet [1]	1.46	0.76	2.22	1.46	0.76	2.22	**4.45**
Piston/Turboprop	4.76	2.58	7.34	4.76	2.58	7.34	**14.68**
Military [2]	0.50	0.00	0.50	0.50	0.00	0.50	**1.00**
Helicopter	8.92	0.27	9.19	8.92	0.27	9.18	**18.37**
TOTAL LOCAL OPERATIONS [5]	**15.64**	**3.61**	**19.25**	**15.64**	**3.61**	**19.25**	**38.50**

- **Future – 2027 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [3]	NIGHT [4]	TOTAL	DAY [3]	NIGHT [4]	TOTAL	**TOTAL**
General Aviation Jet [1]	1.82	0.96	2.77	1.82	0.96	2.77	**5.54**
Piston/Turboprop	5.74	3.11	8.86	5.74	3.11	8.86	**17.71**
Military [2]	0.58	0.00	0.58	0.58	0.00	0.58	**1.15**
Helicopter	10.73	0.32	11.06	10.73	0.32	11.06	**22.11**
TOTAL LOCAL OPERATIONS [5]	**18.86**	**4.39**	**23.26**	**18.86**	**4.39**	**23.26**	**46.52**

NOTES:

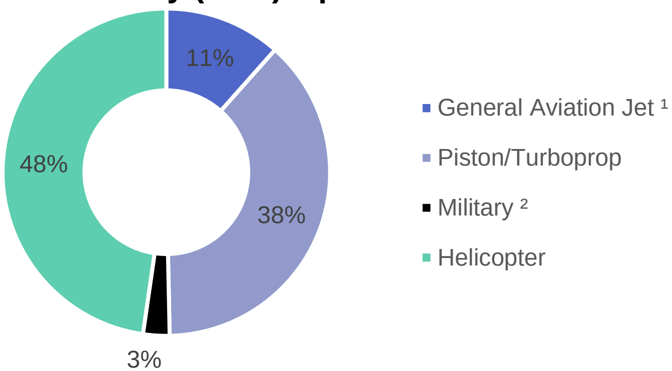
1 General Aviation Jet – Non-commercial jet aircraft.
2 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories,
3 Day = 7:00 a.m. to 9:59 p.m.
4 Night = 10:00 p.m. to 6:59 a.m.
5 Totals may not add due to round

SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

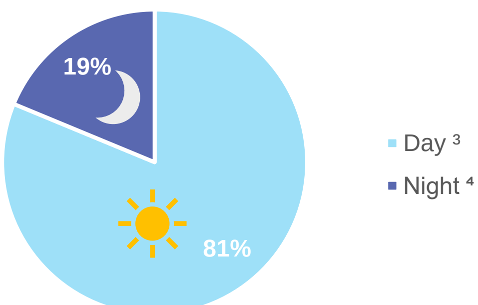
Average Annual Local Operations & Time of Day

Existing – 2019 (DRAFT)

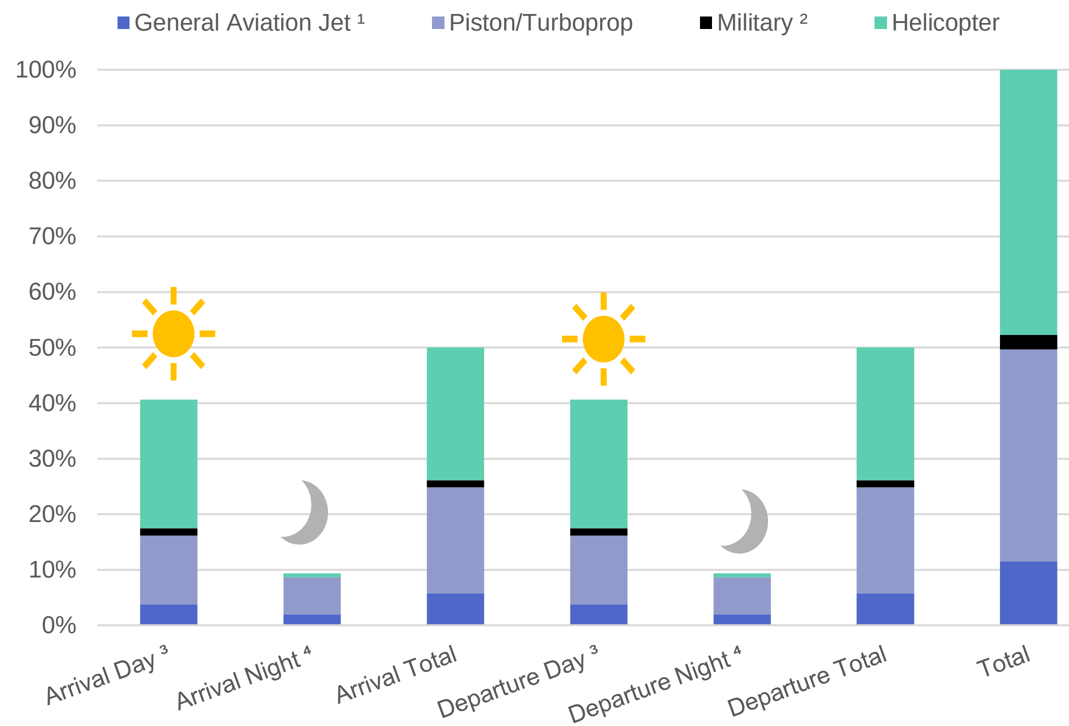
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



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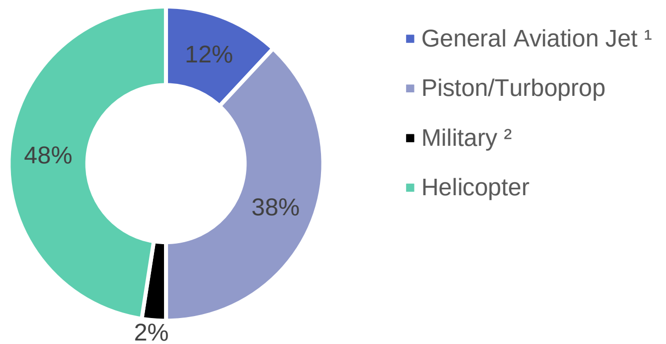
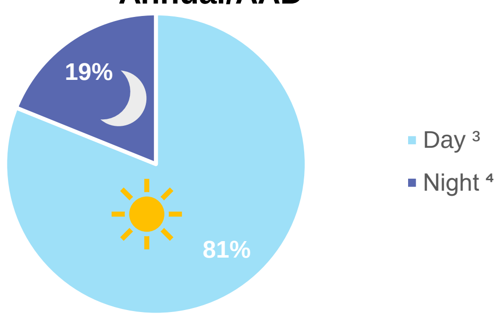
Average Annual Local Operations & Time of Day

Future – 2027 (DRAFT)

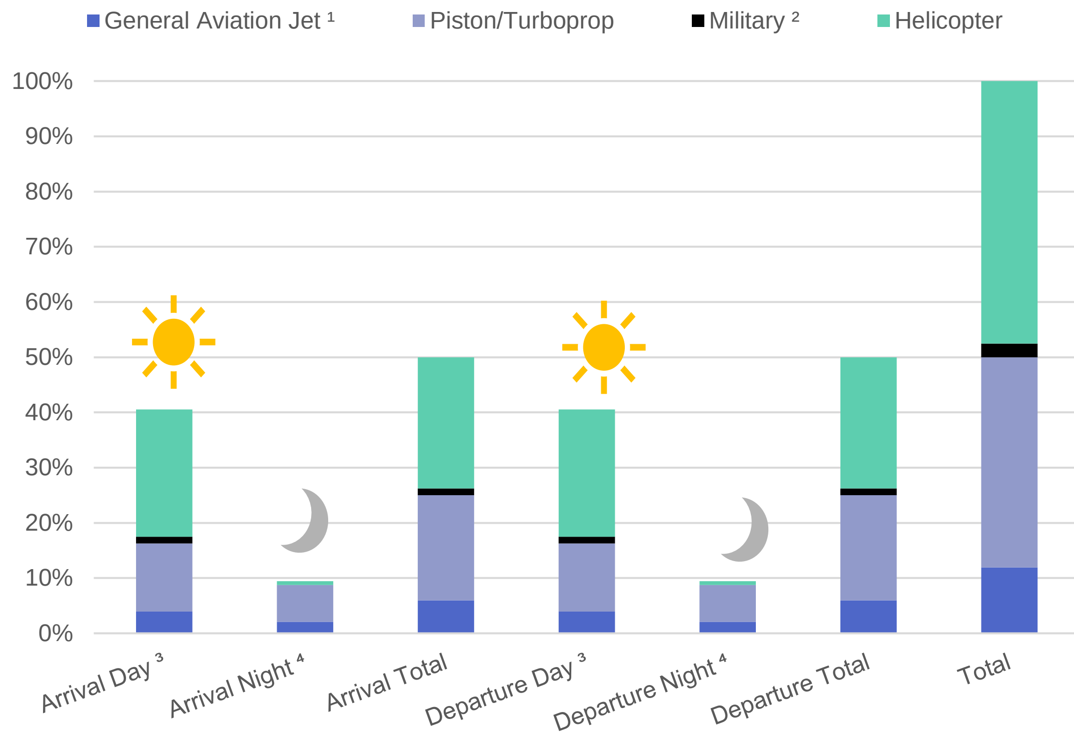
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



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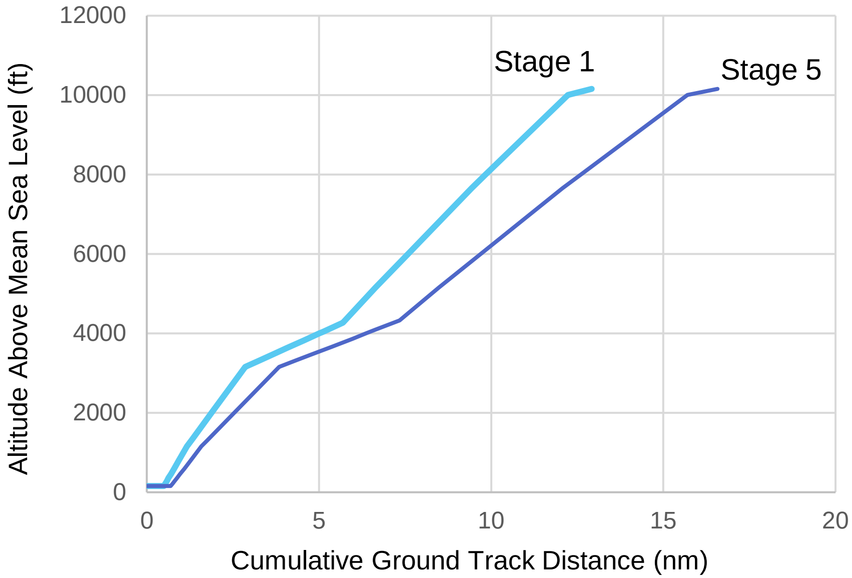
Noise Model Methodology – Stage Length

- Departure flight distance from airport to destination

STAGE LENGTH CATEGORIES	
CATEGORY	STAGE LENGTH (NAUTICAL MILES)
1	0 – 500
2	500 – 1,000
3	1,000 – 1,500
4	1,500 – 2,500
5	2,500 – 3,500
6	3,500 – 4,500
7	4,500 – 5,500
8	5,500 – 6,500
9	6,500 +

Example: Stage Length Comparison for Boeing 717-200



- Composite Stage Length Distribution for Commercial Aircraft

	STAGE LENGTH					
YEAR	1	2	3	4	5	TOTAL
EXISTING - 2019	63.32%	0.00%	0.00%	33.53%	3.15%	100.00%
FUTURE - 2027	59.25%	0.00%	0.00%	37.42%	3.33%	100.00%

SOURCES: Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT): Version 3d Technical Manual,* March 2021 (stage length categories); Ricondo & Associates, Inc., December 2016. (runway use percentage for local operations); Diio Mi, October 2021 (ATCT operation counts from FAA's OPSNET and Innovata schedule); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update: Aviation Activity Forecasts*, March 2021; Ricondo & Associates, Inc., October 2021 (stage length comparison for Boeing 717-200).

Noise Model Methodology – Runway Use

Itinerant Operations 2019 & 2027

LEGEND

Arrivals

Departures

NOTES:
1 Daytime = 7:00 a.m. to 9:59 p.m.
2 Nighttime = 10:00 p.m. to 6:59 a.m.
3. Totals do not add up due to rounding

SOURCES: Woolpert, August 2019 (aerial imagery); State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative - LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Runway Use

Local Operations
2019 & 2027

LEGEND

Arrivals

Departures

NOTES:
1 Daytime = 7:00 a.m. to 9:59 p.m.
2 Nighttime = 10:00 p.m. to 6:59 a.m.
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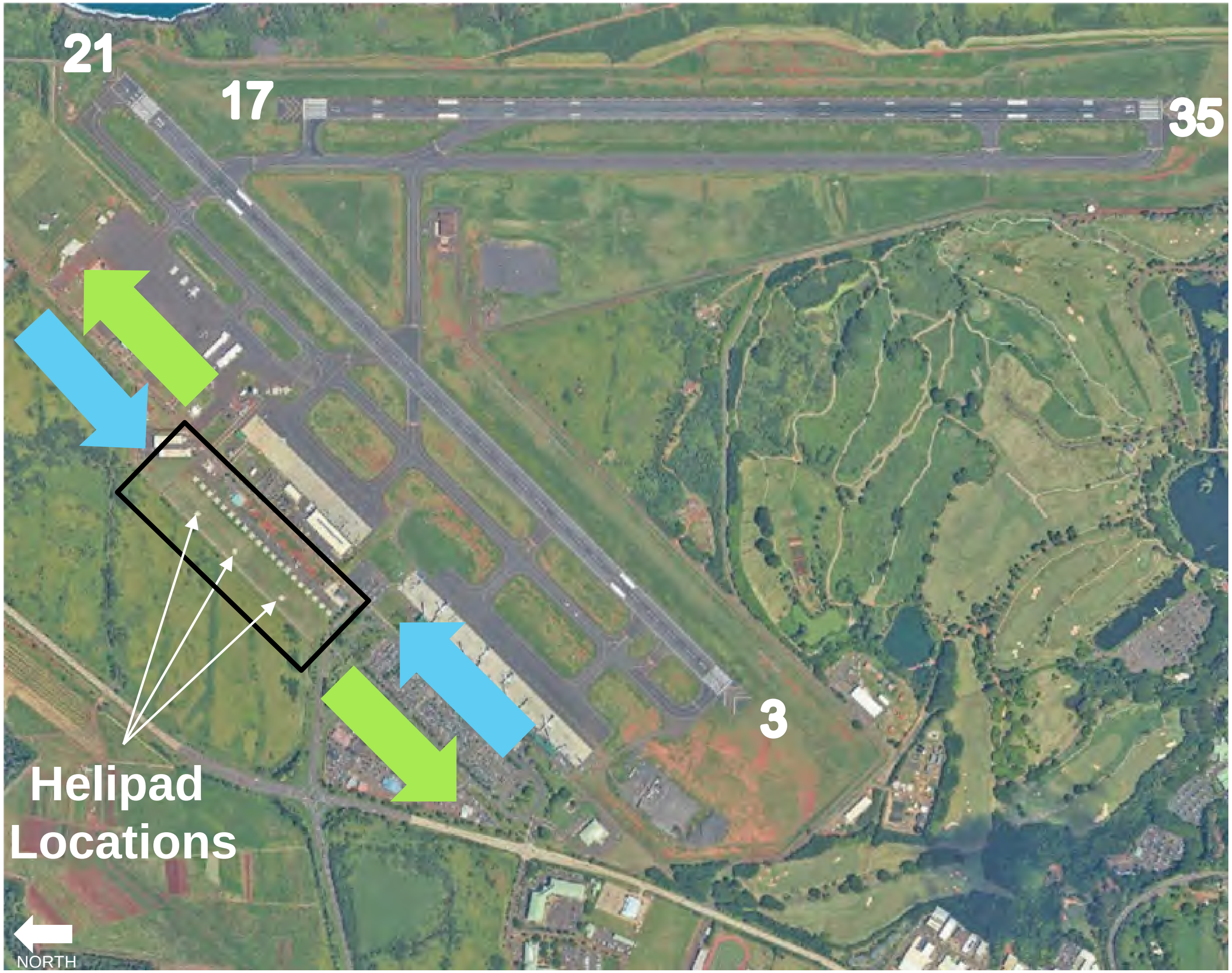
SOURCES: Woolpert, August 2019 (aerial imagery); State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative - LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Helipad Use

- Three helipads
- Modeled as one helipad



LEGEND

Primary Arrivals

Primary Departures

SOURCES: Woolpert, August 2019 (aerial imagery); Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Flight Tracks

NORTH

Generalized Fixed-Wing

Arrivals

Departures

LEGEND

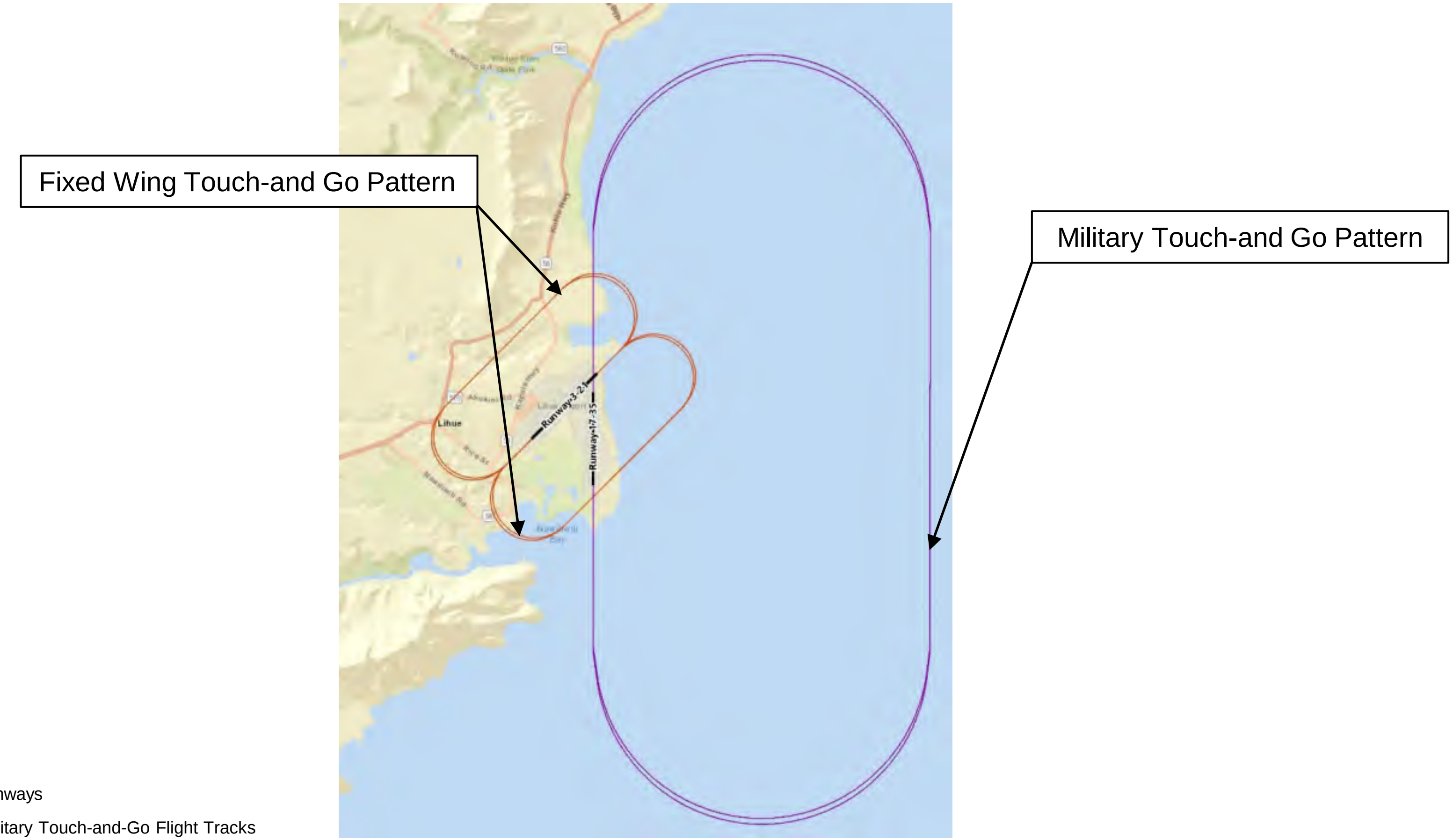
- Existing Runways
- Modeled Arrival Aircraft Flight Tracks
- Modeled Departure Aircraft Flight Tracks

SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Noise Model Methodology – Flight Tracks

Generalized Fixed-Wing/Military
Touch-and-Go

NORTH



LEGEND

- Existing Runways
- Modeled Military Touch-and-Go Flight Tracks
- Modeled Fixed-Wing Touch-and-Go Pattern

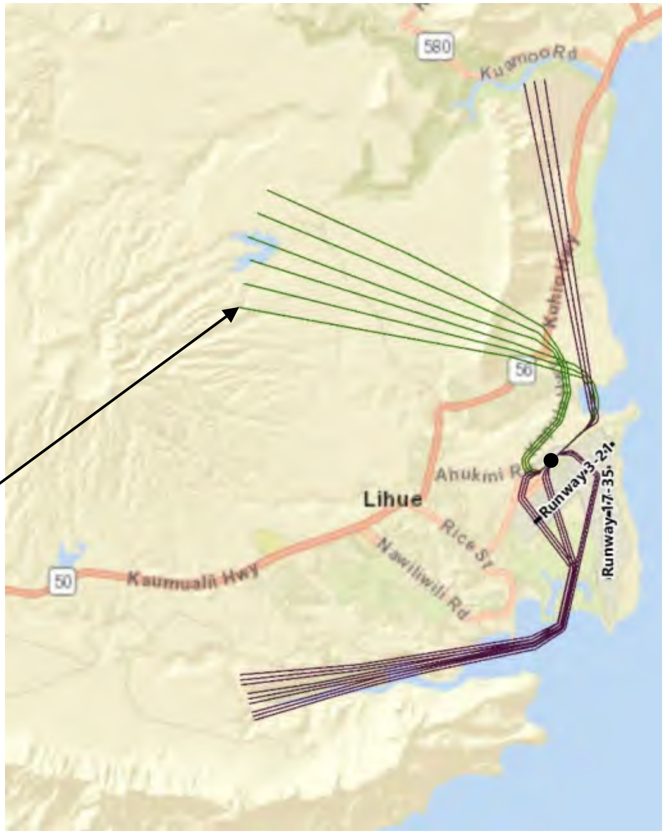
SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Noise Model Methodology – Flight Tracks

Generalized Helicopter

Arrivals and Departures

NORTH



Helicopters Approach: 800 to 1,000 feet (AGL)

NOTE: AGL – Above Ground Level

LEGEND

- Existing Helipads
- Existing Runways
- Modeled Helicopter Arrival Aircraft Flight Tracks
- Modeled Helicopter Departure Aircraft Flight Tracks

SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Noise Model Methodology – Flight Tracks

Generalized Helicopter
Touch-and-Go

NORTH

LEGEND

- Existing Helipads
- Existing Runways
- Modeled Helicopter Touch-and-Go Pattern

SOURCES: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, Open Street Map Contributors, and the GIS User Community, September 2021 (basemap); Ricondo & Associates, Inc., October 2021 (modeled flight tracks).

Land Use Compatibility

Land Use Compatibility – FAA

Land use	Yearly day-night average sound level (Ldn) [DNL] in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail -- building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade – general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps.	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation.	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NLR: Noise Level Reduction

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Notes for Table 1

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Source: 14 CFR Part 150, Appendix A, Table 1. [Bracketed material and color added by Ricondo & Associates, Inc.]

Land Use Compatibility – State of Hawaii

LAND USE	YEARLY DAY-NIGHT NOISE LEVEL (DNL) IN DECIBLES					
	BELOW 60	60-65	65-70	70-75	75-80	80-85
Residential						
Low density residential, resorts, and hotels (outdoor facility)	Y(1)	N(2)	N	N	N	N
Low density apartment with moderate outdoor use	Y	N(2)	N	N	N	N
High density apartment with limited outdoor use	Y	N(2)	N(2)	N	N	N
Transient lodgings with limited outdoor use	Y	N(2)	N(2)	N	N	N
Public Use						
Schools, day-care centers, libraries, and churches	Y	N(3)	N(3)	N(3)	N	N
Hospitals, nursing homes, clinics, and health facilities	Y	Y(4)	Y(4)	Y(4)	N	N
Indoor auditoriums and concert halls	Y(3)	Y(3)	N	N	N	N
Governmental services and office buildings serving the general public	Y	Y	Y(4)	Y(4)	N	N
Transportation and parking	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Commercial Use and Government Use						
Offices – government, business ,and professional	Y	Y	Y(4)	Y(4)	N	N
Wholesale and retail--building materials, hardware, and heavy equipment	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Airport businesses – car rental, tours, lei stands, ticket offices, etc.	Y	Y	Y(4)	Y(4)	N	N
Retail, restaurants, shopping centers, financial institutions, etc.	Y	Y	Y(4)	Y(4)	N	N
Power plants, sewage treatment plants, and base yards	Y	Y	Y(4)	Y(4)	Y(4)	N
Studios without outdoor sets, broadcasting, production facilities, etc.	Y(3)	Y(3)	N	N	N	N
Manufacturing, Production, and Storage						
Manufacturing, general	Y	Y	Y(4)	Y(4)	Y(4)	N
Photographic and optical	Y	Y	Y(4)	Y(4)	N	N
Agriculture (except livestock) and forestry	Y	Y(5)	Y(5)	Y(5)	Y(5)	Y(5)
Livestock farming and breeding	Y	Y(5)	Y(5)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(6)	Y(6)	N	N	N
Outdoor music shells, amphitheaters	Y(6)	N	N	N	N	N
Nature exhibits and zoos, neighborhood parks	Y	Y	N	N	N	N
Amusements, beach parks, active playgrounds, etc.	Y	Y	Y	Y	N	N
Public golf courses, riding stables, cemeteries, gardens, etc.	Y	N	N	N	N	N
Professional/resort sport facilities, locations of media events, etc.	Y(6)	N	N	N	N	N
Extensive natural wildlife and recreation areas	Y(6)	N	N	N	N	N

Numbers in parentheses refer to notes

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NOTES:

Y – yes, land use and related structures are compatible without restrictions.

N – no, land use and related structures are not compatible and should be prohibited.

(1) A noise level 60 DNL does not eliminate all risks of adverse noise impacts from aircraft noise. However, the 60 DNL planning level has been selected by the Hawaii State Department of Transportation – Airports Division as an appropriate compromise between the minimal risk level of 55 DNL and significant risk level of 65 DNL.

(2) Where the community determines that these uses must be allowed, Noise Level Reduction (NLR) measures to achieve interior levels of 45 DNL or less should be incorporated into building codes and be considered in individual approvals. Normal local construction employing natural ventilation can be expected to provide an average NLR, and will not eliminate outdoor noise problems.

(3) Because of the DNL noise descriptor system represents a 24-hour average of individual aircraft noise events, each of which can be unique in respect to amplitude, duration, and tonal content, the NLR requirements should be evaluated for the specific land use, interior acoustical requirements, and properties of the aircraft noise events. NLR requirements should not be based solely upon the exterior DNL exposure level.

(4) Measures to achieve required NLR must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

(5) Residential buildings require NLR. Residential buildings should not be located where noise is greater than 65 DNL.

(6) Impact of amplitude, duration, frequency, and tonal content of aircraft noise events should be evaluated.

SOURCE: State of Hawaii Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Update*, April 2013.

Land Use Compatibility – FAA vs. State of Hawaii

- Hawaii guidelines developed due to the outdoor life-style of the people and that majority of residences are naturally ventilated
- Considers land uses below DNL 60 dBA as compatible
- Utilizes DNL 55 dBA for the required buyer notification boundary

State Land Use Compatibility Table Changes to FAA Table

	TABLE SET UP	TABLE FOOTNOTES
1	Criteria of yearly DNL ranges are below DNL 60 TO DNL 85 in lieu of below DNL 65 to Over DNL 85.	Community determines residential uses to achieve NLR interior levels of DNL 45. Normal local construction can be expected to provide an average NLR of approximately 9 dBA.
2	Residential land use category is delineated into low density and high density.	NLR requirements should be evaluated and not be based solely upon the exterior DNL exposure level for schools, indoor auditoriums, concert halls, studios without outdoor sets, broadcasting, and production facilities.
3	Additional land use categories included under recreation: professional/resort sport facilities, locations of media events, extensive natural wildlife, and recreation areas	No indication of dBA measurement to achieve required NLR for the design and construction of buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

NOTE: NLR – Noise Level Reduction
SOURCE: State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Program: Volume 1-Noise Exposure Map Report*, May 1989.

Existing Land Use Map

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); SSFM International, Inc., Kauai General Plan, 2018 (land use boundaries); State of Hawaii Department of Transportation – Airports Division, Lihue Airport Plan, October 2020 (existing and future airport property boundaries, and future easements); County of Kauai, *https://kauai.gov/Government/Departments-Agencies/Public-Works/Building-Division/Projects/Bike-Path-Project/Nawiliwili-Ahukini-Bike-Path (accessed May 19, 2021);* Wilson Okamoto Corporation and State of Hawaii DOT-Airports Division, *Final Environmental Impact Statement: Lihue Airport Improvements-Appendix D*, November 2007 (historic properties); US Census Bureau, 2021 (roads and county boundary); Ricondo & Associates, Inc., March 2021 (multi-family residential).

Existing Zoning Map

SOURCES: Woolpert, August 2019 (aerial photography – for visual reference only, may not be to scale); SSFM International, Inc., 2018 (Kauai County Zoning Ordinance); State of Hawaii Department of Transportation – Airports Division, Lihue Airport Plan, October 2020 (existing and future airport property boundaries, and future easements); US Census Bureau, 2021 (roads and county boundary); Ricondo & Associates, Inc., March 2021 (multi-family residential).

Public Involvement Plan

Public Involvement Plan

- Visit - www.lihmasterplan.com
  - Source for updates and document for review
  - Register to get updates
  - Provide comments
- Release of Draft NEM Update Report for public review and comment
- Public Information Meeting #2 - To Be Determined

Next Steps

Next Steps

- Finalize Noise Modeling
- Draft NEM Update Report
- Provide Draft NEM Update Report for Review
- Next Public Information Meeting – To Be Determined

Questions and Answers

APPENDIX D.2

Public Meeting #1 Legal Advertisement and Affidavit of Publication

AFFIDAVIT OF PUBLICATION

IN THE MATTER OF
LEGAL NOTICE

STATE OF HAWAII }
} **SS.**
City and County of Honolulu }

Doc. Date: OCT 1 2 2021 **# Pages:** 1
Notary Name: COLLEEN E. SORANAKA First Judicial **Circuit**
Doc. Description: Affidavit of Publication

OCT 1 2 2021

Notary Signature Date

COLLEEN E. SORANAKA NOTARY PUBLIC No. 90-263 STATE OF HAWAII

Lisa Sakakida being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of Oahu Publications, Inc. publisher of The Honolulu Star-Advertiser, MidWeek, The Garden Island, West Hawaii Today, and Hawaii Tribune-Herald, that said newspapers are newspapers of general circulation in the State of Hawaii, and that the attached notice is true notice as was published in the

Honolulu Star-Advertiser 0 times on:

MidWeek 0 times on:

The Garden Island 1 times on:
10/12/2021

Hawaii Tribune-Herald 0 times on:

West Hawaii Today 0 times on:

Other Publications: 0 times on:

And that affiant is not a party to or in any way interested in the above entitled matter.

Lisa Sakakida

Subscribed to and sworn before me this 12th day of October A.D. 2021

Colleen E. Soranaka, Notary Public of the First Judicial Circuit, State of Hawaii
My commission expires: Jan 06 2024

Ad # 0001344948

COLLEEN E. SORANAKA NOTARY PUBLIC No. 90-263 STATE OF HAWAII

ICSP NO.: ______

LEGAL NOTICE

NOTICE OF PUBLIC INFORMATION MEETING
LIHUE AIRPORT NOISE EXPOSURE MAP UPDATE

Date: Tuesday, October 26, 2021
Time: 6:00 pm HST
Location: Via Zoom Video Conferencing
https://ricondo.zoom.us/j/97485286062
Meeting ID: 974 8528 6062
(877) 853-5257 US Toll-free, or
(888) 475-4499 US Toll-free

The State of Hawaii, Department of Transportation (HDOT), Airports Division, is conducting a public information meeting for the *Lihue Airport Noise Exposure Map Update* (Study). The Study will update the Noise Exposure Maps that are used to evaluate land use compatibility with Lihue Airport. The purpose of this public information meeting is to discuss the work plan and afford the community an opportunity to comment on airport noise concerns.

Due to the COVID19 pandemic, this meeting will be held virtually. To attend, please visit the study website www.lihmasterplan.com to register and/or see the Zoom link above.

Presentation materials shared during the meeting can be viewed on the study website www.lihmasterplan.com after the conclusion of the information meeting.

If you have any questions, please reach out via the study website www.lihmasterplan.com or in writing to:

The State of Hawaii, Department of Transportation
Airports Division
400 Rodgers Boulevard, Suite 700
Honolulu, Hawaii 96819
Attention: Mr. Raymond Severn

JADE T. BUTAY
Director of Transportation
(TGI1344948 10/12/21)

Legal Notices | Legal Notices

LEGAL NOTICE

NOTICE OF PUBLIC INFORMATION MEETING
LIHUE AIRPORT NOISE EXPOSURE MAP UPDATE

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The State of Hawaii, Department of Transportation
Airports Division
400 Rodgers Boulevard, Suite 700
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Attention: Mr. Raymond Severn

JADE T. BUTAY
Director of Transportation
(TGI1344948 10/12/21)

Notice #: 0001344948-01
Legal Notices
Start Date: October 12, 2021
End Date: October 12, 2021

LEGAL NOTICE
NOTICE OF PUBLIC INFORMATION MEETING
LIHUE AIRPORT NOISE EXPOSURE MAP UPDATE
Date: Tuesday, October 26, 2021
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Attention: Mr. Raymond Severn

JADE T. BUTAY
Director of Transportation
(TGI1344948 10/12/21)

APPENDIX D.3

Public Meeting #1 Comments Received

NO PUBLIC COMMENTS WERE RECEIVED

APPENDIX D.4

Public Meeting #1
Website Announcement

LIHUE NOISE EXPOSURE MAP UPDATE
MEETING DETAILS

Date: Tuesday, October 26, 2021
Time: 6:00 pm HST
Location: Via Zoom Video Conferencing
https://ricondo.zoom.us/j/97485286062
Meeting ID: 974 8528 6062
877 853 5257 US Toll-free, or
888 475 4499 US Toll-free

The Hawai'i Department of Transportation (HDOT), Airports Division is conducting the first of two public information meetings for the *Lihue Airport Noise Exposure Map (NEM) Update* (Study). The Study is based on Title 14 Code of Federal Regulations (CFR) Part 150, Airport Noise Compatibility Planning which requires land uses located in the airport environs be reviewed to understand the relationship between land uses and noise exposure associated with aircraft activity at an airport. A NEM graphically depicts aircraft noise exposure on and in the vicinity of an airport by presenting lines of equal day-night average sound level (DNL) values. NEMs provide local communities an opportunity to visualize aircraft noise exposure to make better informed decisions regarding proposed noise-sensitive development within the immediate surrounding environs of an airport.

The purpose of this first public information meeting is to afford the community an opportunity to comment on the work plan, aircraft noise modeling methodology, airport-specific aircraft operations forecast and aircraft noise concerns. HDOT staff and expert consultants will be in attendance to present information and answer questions during the meeting.

Questions will be addressed at the public information meeting, but members of the public are encouraged to submit written comments via the study website www.lihmasterplan.com or in writing to:

Hawaii Department of Transportation – Airports Division
Attn: Mr. Raymond Severn
400 Rodgers Blvd. Suite 700 Honolulu, Hawai'i 96819

Due to the COVID-19 pandemic, this meeting will be held virtually. If you need an auxiliary aid/service or other accommodation due to a disability, or language interpretation for languages other than English, contact Mr. Raymond Severn by phone at 808-838-8817 or by email at raymond.s.severn@hawaii.gov as soon as possible. Requests made as early as possible will allow adequate time to fulfill your request. Upon request, this notice is available in alternate formats such as large print, Braille, or electronic copy.

APPENDIX D.5

Public Meeting #2 Presentation

Lihue Airport Noise Exposure Map Update

Public Information Meeting #2

May 5, 2022

Welcome

- Opening remarks by Herman Tuiolosega, Hawaii Department of Transportation, Airports, Planning Division Section Head

- Follow up remarks by Ura Yvan, Ricondo & Associates, Inc. – Meeting Moderator
  - Purpose
  - A Draft for the Lihue Airport Noise Exposure Map Report is posted on the website at: https://www.lihmasterplan.com/documentation/
  - Presentation will be recorded and posted on the website at: https://www.lihmasterplan.com/stay-informed/
  - Not being recorded for testimony, for information purposes only
  - **Comments must be received by 5:00 p.m. HST on May 16, 2022**, via:
    - The website at the bottom of the "Stay Informed" page
    - Mail, post-marked May 16, 2022, sent to:

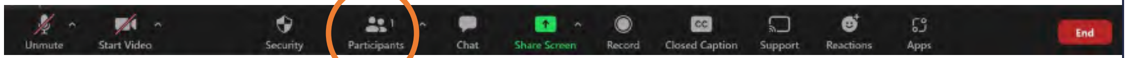
      Hawaii Department of Transportation – Airports Division
      Attn: Mr. Ray Severn
      400 Rodgers Blvd. Suite 700
      Honolulu, Hawaii 96819

SCAN ME

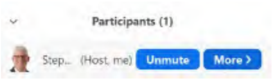
Zoom Protocol

- Welcome
  - Update your Name
    1. First and Last Name
    2. Ex: Raymond Severn
  - Names to be used to identify commenters

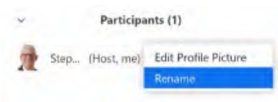
1. At the bottom of the screen in Zoom, click on the “Participants” icon.



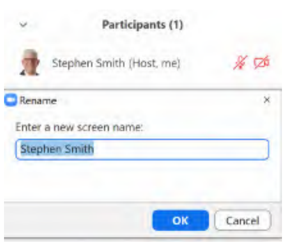
2. A list of participants will appear on the right-hand side of the Zoom room. Hover over your name and click the “More” button.



3. Click the “Rename” option



4. Enter your name in the “Enter a new screen name” field. If available on the screen, make sure to uncheck “Remember my name for future meetings” if you wish not to carry the changes forward for future Zoom meetings.



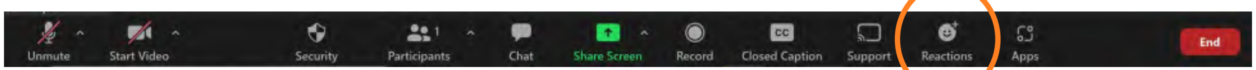
Note: some users may have a different version of Zoom with different locations of commands, but the participant symbology should be the same.

Zoom Protocol

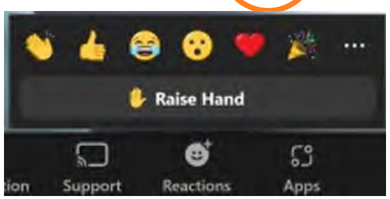
- Commenting
  - All participants will be muted by the moderator
  - Moderator will call on participants who:

1. Raise hand physically (if video is on)
2. Raise hand virtually (hand feature)

Hand feature: select “Reactions” icon then



Select “Raise Hand” button



3. Comment in chat

4. Send an email to uyvan@ricondo.com (if none of these features work and you are a committee member with a question or comment)

Agenda

1. Title 14 CFR Part 150 Overview
2. Roles in NEM Update
3. Understanding Noise and Sound Level Metrics
4. Operations Forecast and Study Years
5. Noise Modeling Methodology and Inputs
6. Land Use Compatibility
7. Results
8. Next Steps
9. Public Comment and Q&A Session

Title 14 Code of Federal Regulations (CFR) Part 150 Overview

Title 14 CFR Part 150 Overview

- Sets forth the regulations and guidelines for airport sponsors to undertake noise compatibility planning

- Establishes the methodology for preparing aircraft noise exposure maps and developing aircraft noise and land use compatibility programs

- 14 CFR Part 150 studies are voluntary and must abide by 14 CFR Part 150 guidelines to be accepted by the Federal Aviation Administration (FAA)

Title 14 CFR Part 150 Overview – History

- Promulgated by the FAA pursuant to the Aviation Safety and Noise Abatement Act (ASNA) of 1979, Public Law 96-193
- In 1981, an Interim Rule on Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning* was issued
- FAR Part 150 finalized in 1985
- Recodified as Title 14 Code of Federal Regulations (CFR) Part 150, *Airport Noise Compatibility Planning*
- Part 150 studies must adhere to 14 CFR Part 150 guidelines for noise exposure maps to be accepted, and noise compatibility programs to be approved by the FAA

Title 14 CFR Part 150 Overview – Parts

- A Title 14 CFR Part 150 Study identifies and evaluates two components – existing and future:
  - aircraft noise
  - land use

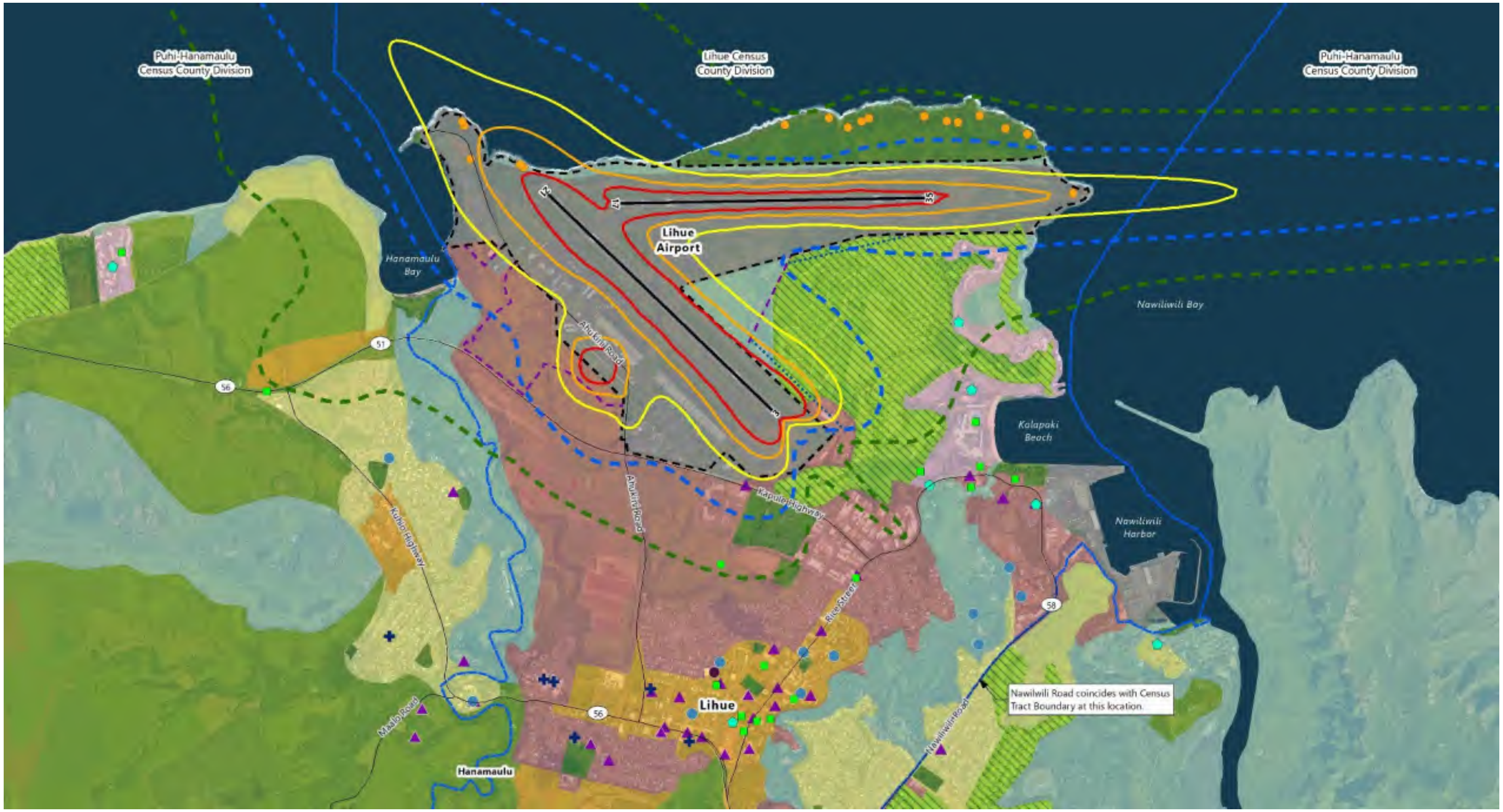
- Consists of two distinct but complementary portions:
  - Noise Exposure Maps (NEM)
  - Noise Compatibility Program (NCP)

- The Lihue Airport (LIH or Airport) Title 14 CFR Part 150 NEM Update:
  - **Will** update existing and future aircraft noise and
  - **Will** reflect existing and future land use conditions
  - **Will not** update the Noise Compatibility Program

Title 14 CFR 150 Overview - Terminology

<u>Aircraft Noise Contour (contour):</u>

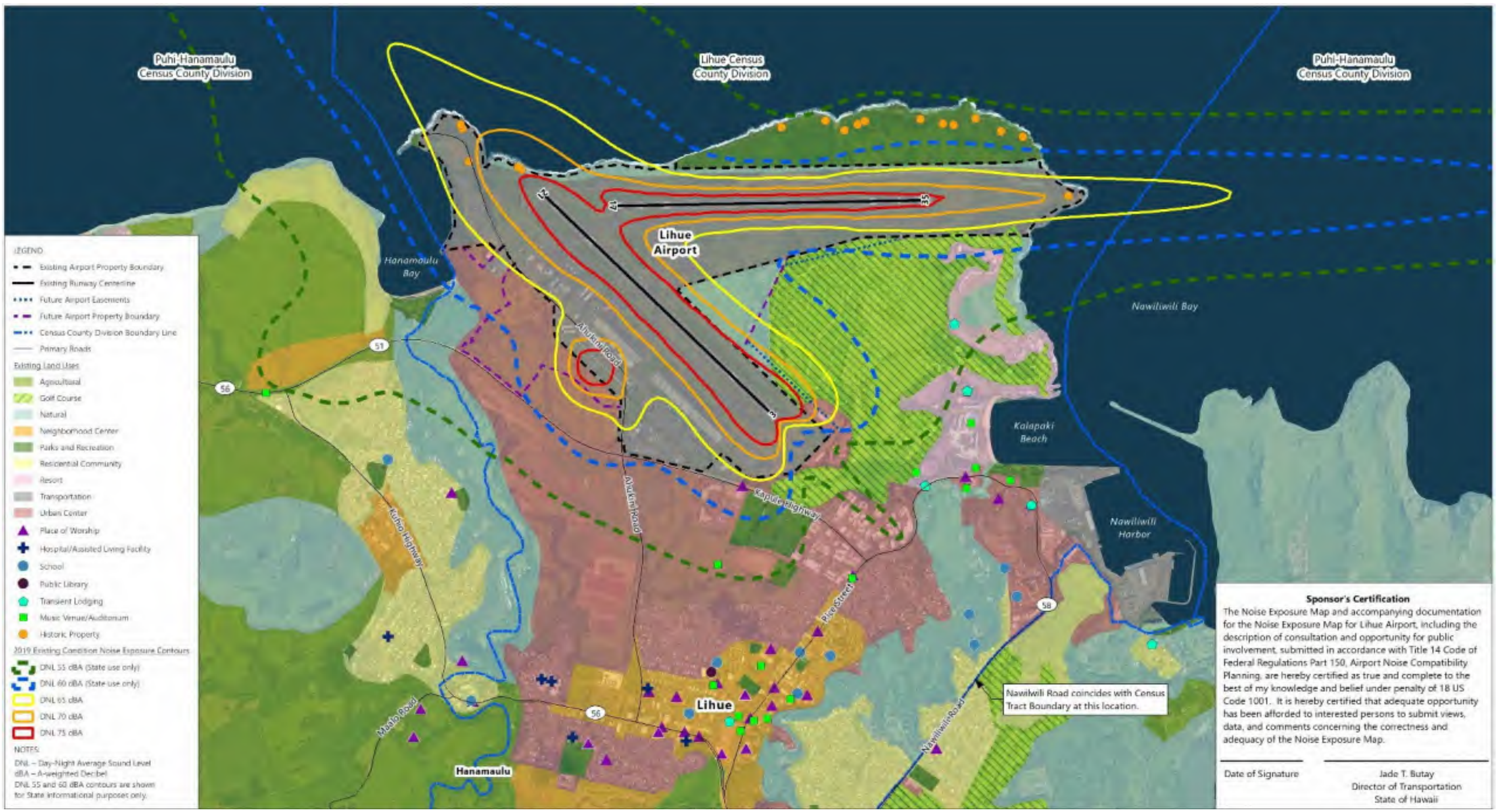
Lines connecting points of equal noise exposure level



SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022.

Title 14 CFR 150 Overview - Terminology

Noise Exposure Map (NEM): Provides information on the existing and future expected areas exposed to various levels of aircraft noise around an airport.



SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022.

Title 14 CFR 150 Overview – NEM Update

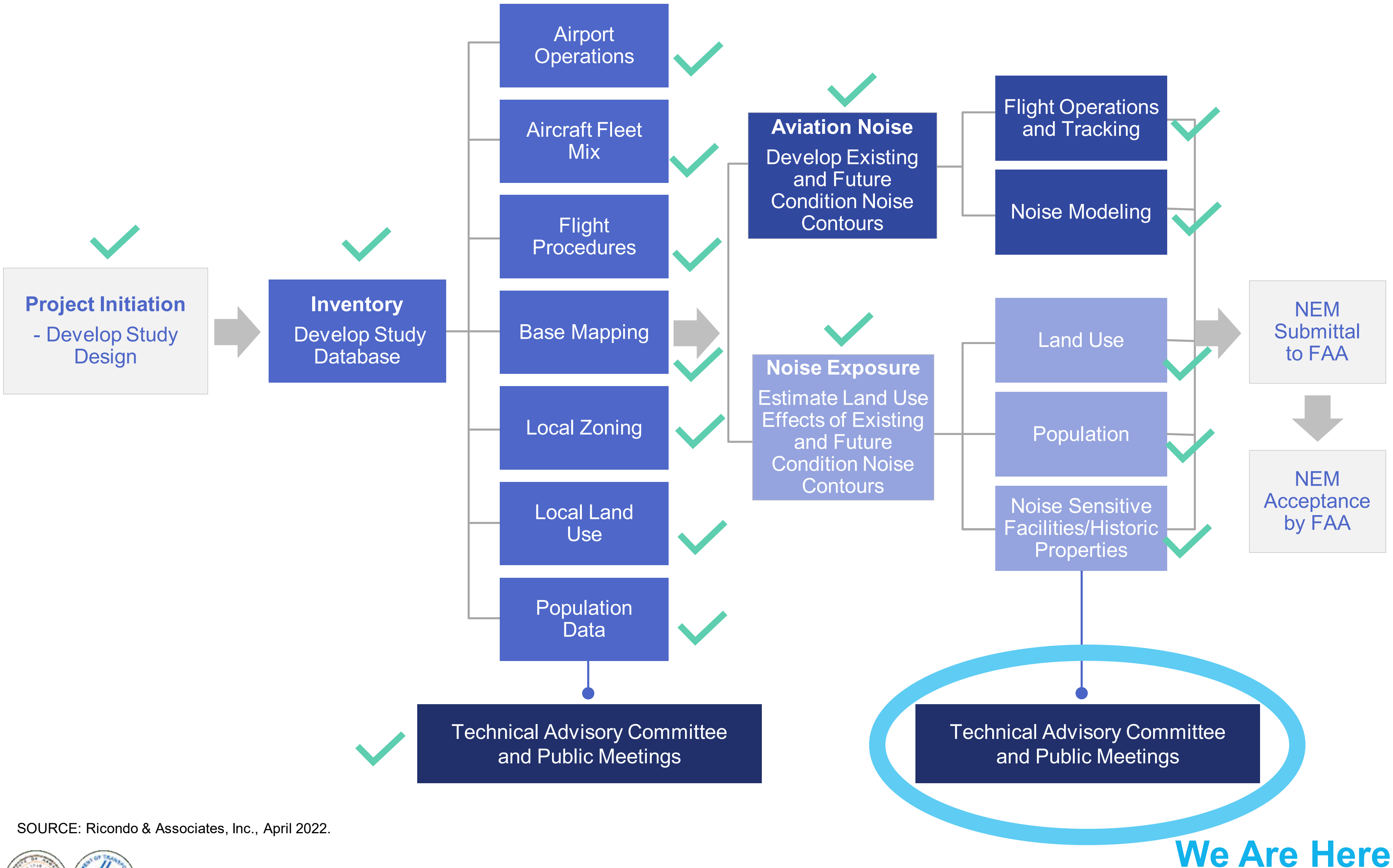
- Determine existing and future noise conditions in the vicinity of the Airport due to changes since previous FAA-accepted NEM in:
  - Operations
  - Aircraft used by operators
  - Airfield (i.e., LIH Runway 3-21 runway safety area improvements)
  - Incompatible land use

- Method:
  - Conduct an update to the NEMs for existing and future conditions
  - Consult stakeholders and provide general public opportunity to comment on update

Title 14 CFR 150 Overview – NEM Update Certification

- DOT-A are expected to certify that:
  - The analysis and results are true and complete to the best of their knowledge and belief under penalty of 18 US Code 1001
  - Adequate opportunity has been afforded to interested persons to submit views, data, and comments concerning the correctness and adequacy of the Noise Exposure Maps and descriptions of forecast aircraft operations.

Title 14 CFR Part 150 Overview – NEM Process



SOURCE: Ricondo & Associates, Inc., April 2022.

Title 14 CFR Part 150 Overview – Regulatory Framework

- **Federal law** establishes aircraft noise standards, operating rules, compatibility planning process, and limitations on the airport owner's capability to restrict aircraft operations.

- **State law** establishes compatibility planning guidelines and noise standards except for aircraft.

- **Local noise ordinances** establishes noise standards and compatible land use planning except for aircraft.

Title 14 CFR Part 150 Overview – Who Can Regulate Airport Noise?

- **Federal Aviation Administration (FAA):**
  - Controls aircraft in flight
  - Regulates aircraft noise at its source (i.e., aircraft engines)
  - Grants aircraft and pilot certification
- **State of Hawaii Department of Transportation – Airports Division (DOT-A) :**
  - Does not have authority to restrict aircraft operations
  - Manages capital improvement projects and infrastructure
  - Has the authority to adopt local land use guidelines with limitations
- **Local Government**:
  - Does not have authority to restrict aircraft operations
  - Enforces compatible land use through zoning
  - Mandates use of sound-insulating building materials
  - Implements real estate disclosure

Federal law preempts state and local regulations.

Roles in NEM Update

Roles

- **FAA**
  - Approve any customization to aircraft noise model input
  - Approve operations forecast
  - Review and accept the NEM
- **DOT-A**
  - Sponsor the NEM Update
  - Certify accuracy of the NEM
  - Consult with agencies and interested parties
  - Provide opportunity for public input
- **Consultant Team**
  - Conduct NEM analysis and prepare documentation
  - Support consultation and public information outreach

Roles (continued)

- **Technical Advisory Committee (TAC)**
  - Provide input and insight on technical issues associated with certain aspects of aviation, airport operations, and land use
- **Public**
  - Review and comment on NEM methodology, existing and forecast airport specific aircraft operations, and aircraft noise concerns

Understanding Noise and Sound Level Metrics

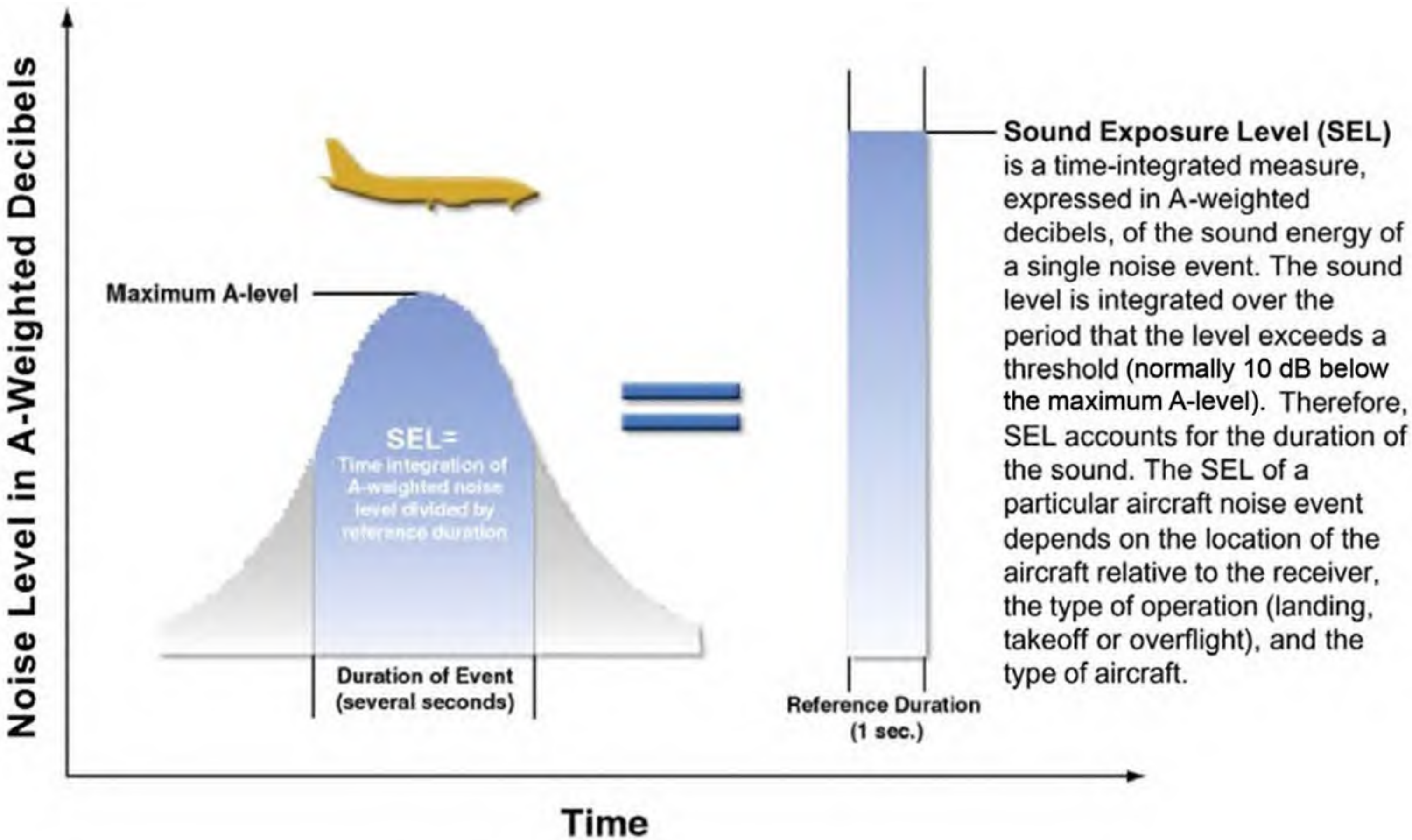
Understanding Noise and Sound Level Metrics

- As required by FAA, airport noise assessments are based on annual Day-Night Average Sound Level (DNL) noise metric
- DNL is expressed in A-weighted decibels (dBA) – focuses on the sound frequencies that are detectible by the human ear
- DNL represents the cumulative effects of all aircraft operations occurring during an average 24-hour period
- Calculated based on an “annual average day” derived from aircraft operations data for an entire calendar year
- In the calculation of DNL, noise events occurring during the nighttime hours (10:00 p.m. to 7:00 a.m.) are increased by a 10-decibel weighting to represent the increased sensitivity of people to noise that occurs at night

Nighttime Penalty Effect:
1 nighttime operation is equivalent to 10 daytime operations

Understanding Noise and Sound Level Metrics

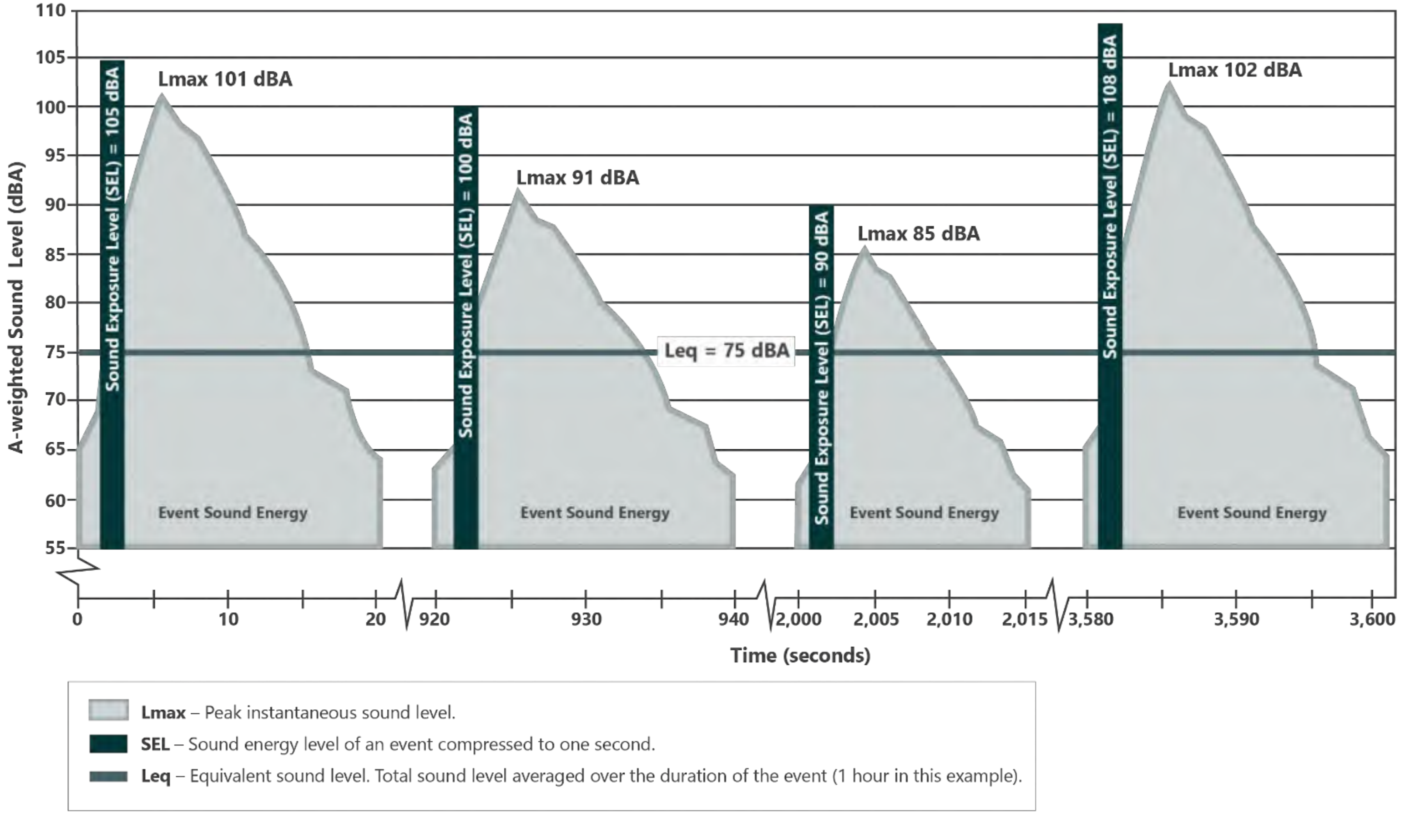
- Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL)



SOURCE: Brown-Buntin Associates, November 2008

Understanding Noise and Sound Level Metrics

➢ Lmax, SEL and Average Sound Level (L_{eq})



Four aircraft overflights occur during a one-hour period.

The peak sound levels (Lmax) range from 85 dBA to 102 dBA.

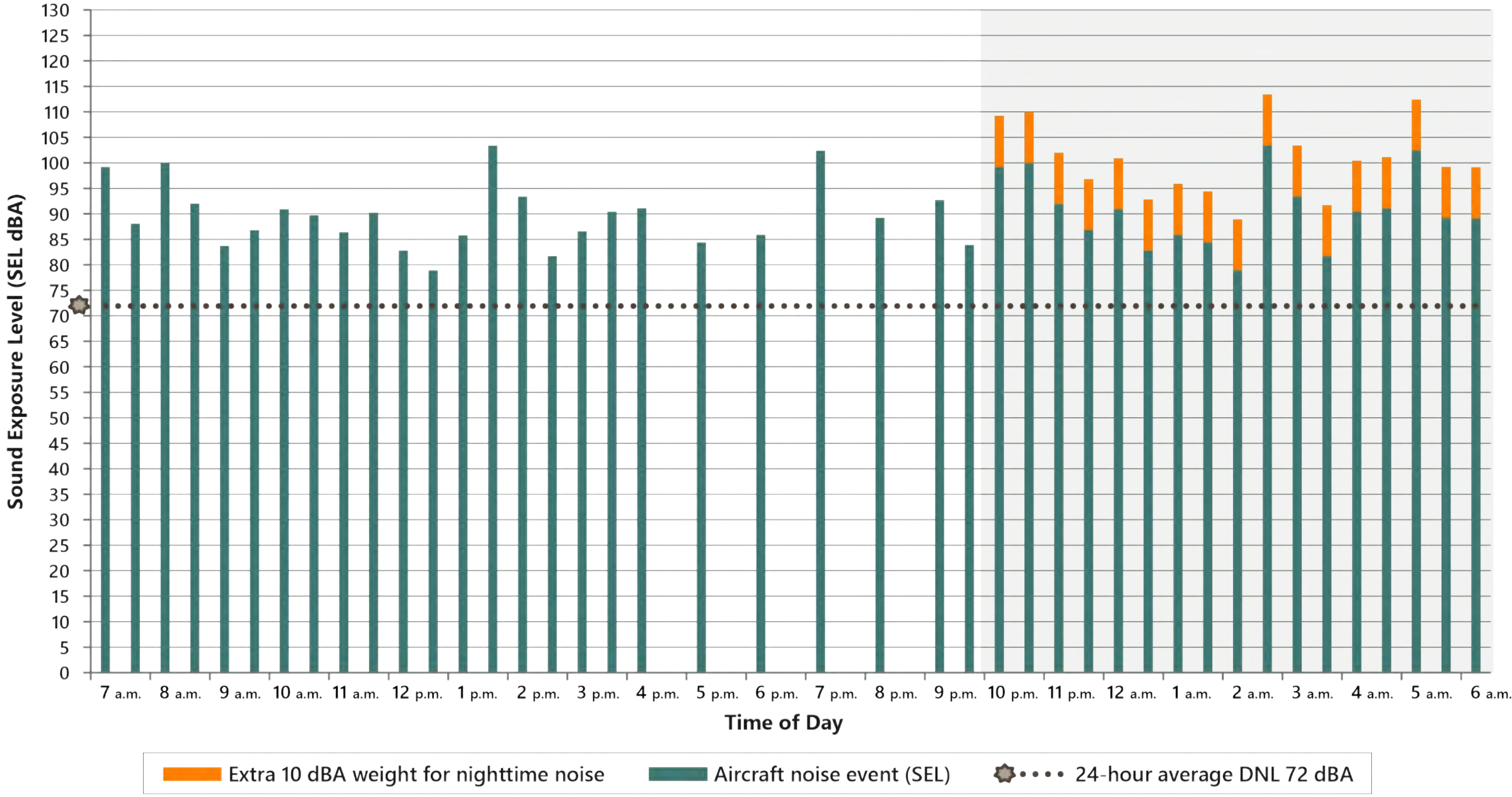
The total sound energy of the events (SEL) range from 90 dBA to 108 dBA.

The cumulative sound level during the hour (Leq) is 75 dBA – the same as a steady sound of 75 dBA throughout the entire hour.

SOURCE: Airport Cooperative Research Program (ACRP), *ACRP Report 15: Aircraft Noise: A Toolkit for Managing Community Expectations* (Figure 6-2, p. 115), 2009; Ricondo & Associates, Inc., October 2021 (updated figure 6-2).

Understanding Noise and Sound Level Metrics

➢ Day-Night Average Sound Level (DNL)



DNL is the metric (or descriptor) that the FAA and the U.S. Department of Defense use to describe the noise environment around civilian and military airports. DNL represents the total, time-weighted noise occurring during a 24-hour period. Noise events after 10:00 p.m. and before 7:00 a.m. are assigned an extra 10 decibels (dBA) in the DNL calculation to reflect the increased sensitivity of people to nighttime noise. For Part 150 studies, the DNL levels are calculated for an "average day" during the study year.

In this example, 42 aircraft noise events occur during the 24-hour period – 25 in daytime and 17 in nighttime hours. The noise levels of the events range from 78 dBA to 103 dBA. The extra 10 dBA assigned to the nighttime events gives them noise levels as high as 113 dBA. The cumulative aircraft noise level for the 24-hour period is DNL 72 dBA, a very high noise level that many people would consider to be annoying at home.

SOURCE: Ricondo & Associates, Inc., October 2021.

Operations Forecast and Study Years

Operations Forecast – Summary

- Based on the Master Plan Update forecast analysis, which was approved by the FAA on September 30, 2020

- Based on 2018 annual aircraft operations and forecast trends prior to COVID-19 Pandemic

- Applied to develop the aircraft activity levels for the future year NEM that represents “at least 5 years” from the year when the NEM Update report is submitted to the FAA

SOURCE: Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020

Operations Forecast – COVID-19 Pandemic

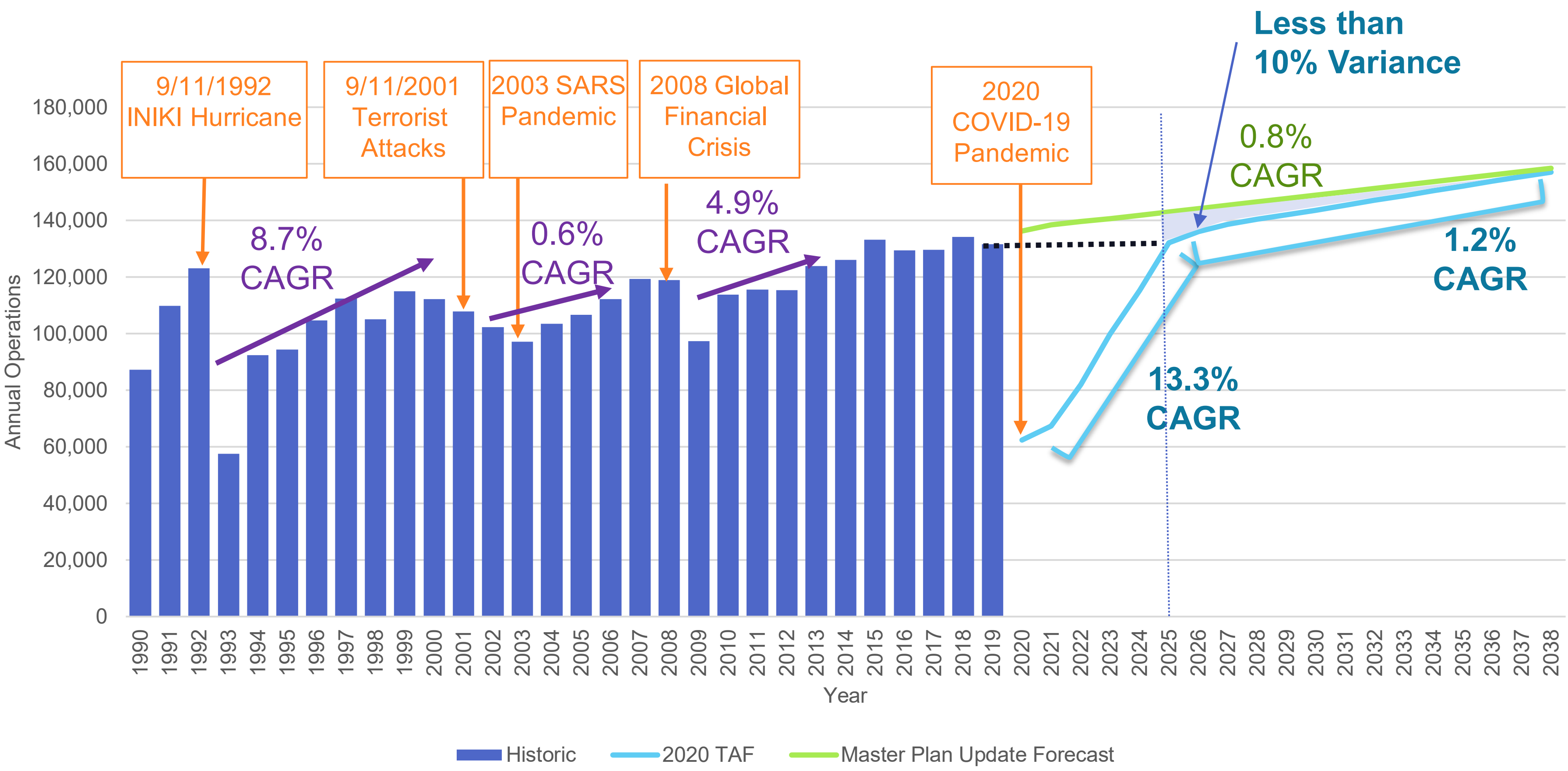
- Considered uncertainties related to the severity and duration of impact remain

- Compared to the 2020 FAA Terminal Area Forecast (TAF)
  - Focus on forecasting the near-term recovery back to 2019 activity
  - Return to 2019 levels in 2025 – a 13.3% compound annual growth rate
  - Master Plan forecast 2027 levels forecast for 2031 in TAF
  - Variance between Master Plan forecast and 2020 TAF less than 10% after recovery to 2019 levels

- Master Plan forecast 2027 levels represent activity levels “at least five years” from expected NEM Update Report submittal to FAA

SOURCE: Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020.

Operations Forecast – COVID-19 Pandemic



NOTES: TAF – Terminal Area Forecast; CAGR – Compound Annual Growth Rate; TAF operations based on federal fiscal year (October to September)
SOURCES: Federal Aviation Administration, 2019 Terminal Area Forecast, February 2020 (historic Federal fiscal year operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020 (Master Plan Update forecast operations, compound annual growth rates and TAF variance to Master Plan forecast from 2025 to 2038).

Study Years

- **2019**
  - Operations have temporarily dropped due to COVID-19 pandemic
  - High short-term growth rate to return to 2019 levels - faster than normal growth rates
    - 2020 to 2025 Master Plan forecast CAGR: 0.8%
    - 2020 to 2025 2020 TAF CAGR: 13.3%
  - 2020 and 2021 are within recovery period and does not represent a reasonable representation of existing conditions
  - Recovery to 2019 operations levels expected to occur within the five-year planning horizon
  - 2019 selected as reasonable representation of existing conditions after recovery from COVID-19 pandemic impacts – FAA concurred on January 21, 2022
- **2027**
  - Master Plan 2027 forecast levels could be reached between 2027 and 2031
  - Forecast operations “at least five years” from submittal of NEM Update to FAA

Forecast – Operations Counts

- Annual Aircraft Itinerant Operations – operations that land at an airport, arriving from outside the airport area, or departs an airport and leaves the airport area

USER CATEGORY	DEFINITION	2019 ACTUAL[1]	2027 FORECAST[2]
Air Carrier	An aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds carrying passengers or cargo for hire or compensation.	27,246	33,919
Air Taxi	An aircraft designed to have a maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less carrying passengers or cargo for hire or compensation.	77,982	86,246
General Aviation	All civil aircraft, except those classified as air carriers or air taxis.	5,868	6,436
Military	All classes of military takeoffs and landings at FAA and FTC facilities.	1,677	1,797
Total	**---**	**112,773**	**128,398**

NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); US Department of Transportation, Federal Aviation Administration, *Aviation Forecast Approval – Lihue Master Plan*, September 30, 2020; Ricondo & Associates, Inc., March 2021 (analysis).

Forecast – Operations Counts (continued)

- Annual Aircraft Local Operations - operations that remain in the local traffic pattern

USER CATEGORY	2019 ACTUAL[1]	2027 FORECAST[2]
General Aviation	13,572	16,558
Military	488	421
Total	**14,060**	**16,979**

NOTES:
1 Represents historical annual operations for the calendar year reported by the Federal Aviation Administration in the 2019 Distributed Operations Network report for the LIH Airport Traffic Control Tower.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: US Department of Transportation, Federal Aviation Administration, Distributed Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); US Department of Transportation, Federal Aviation Administration, Aviation Forecast Approval – Lihue Master Plan, September 30, 2020; Ricondo & Associates, Inc., March 2021 (analysis).

- Annual Total Operations

2019 ACTUAL[1]	2027 FORECAST[2]
126,833	**145,377**

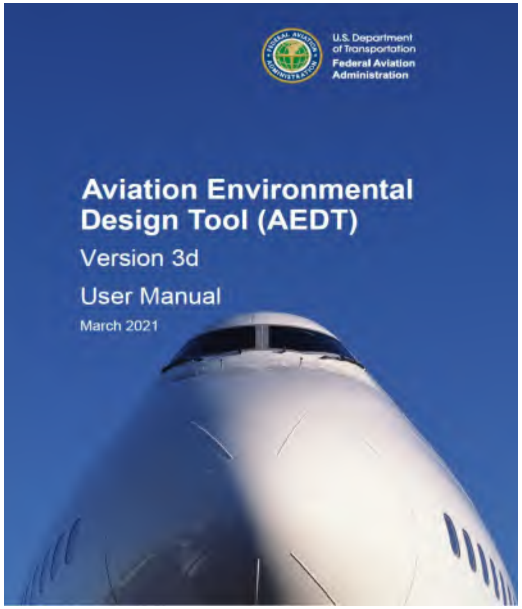
NOTES:
1 Represents historical annual operations for the calendar year.
2 Represents annual operations from the Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts.
SOURCES: Federal Aviation Administration, https://aspm.faa.gov/aspmhelp/index/Glossary.html, (accessed October 7, 2021); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Update - Aviation Activity Forecasts*, March 2020.

Noise Modeling Methodology and Inputs

Noise Model Methodology – Overview

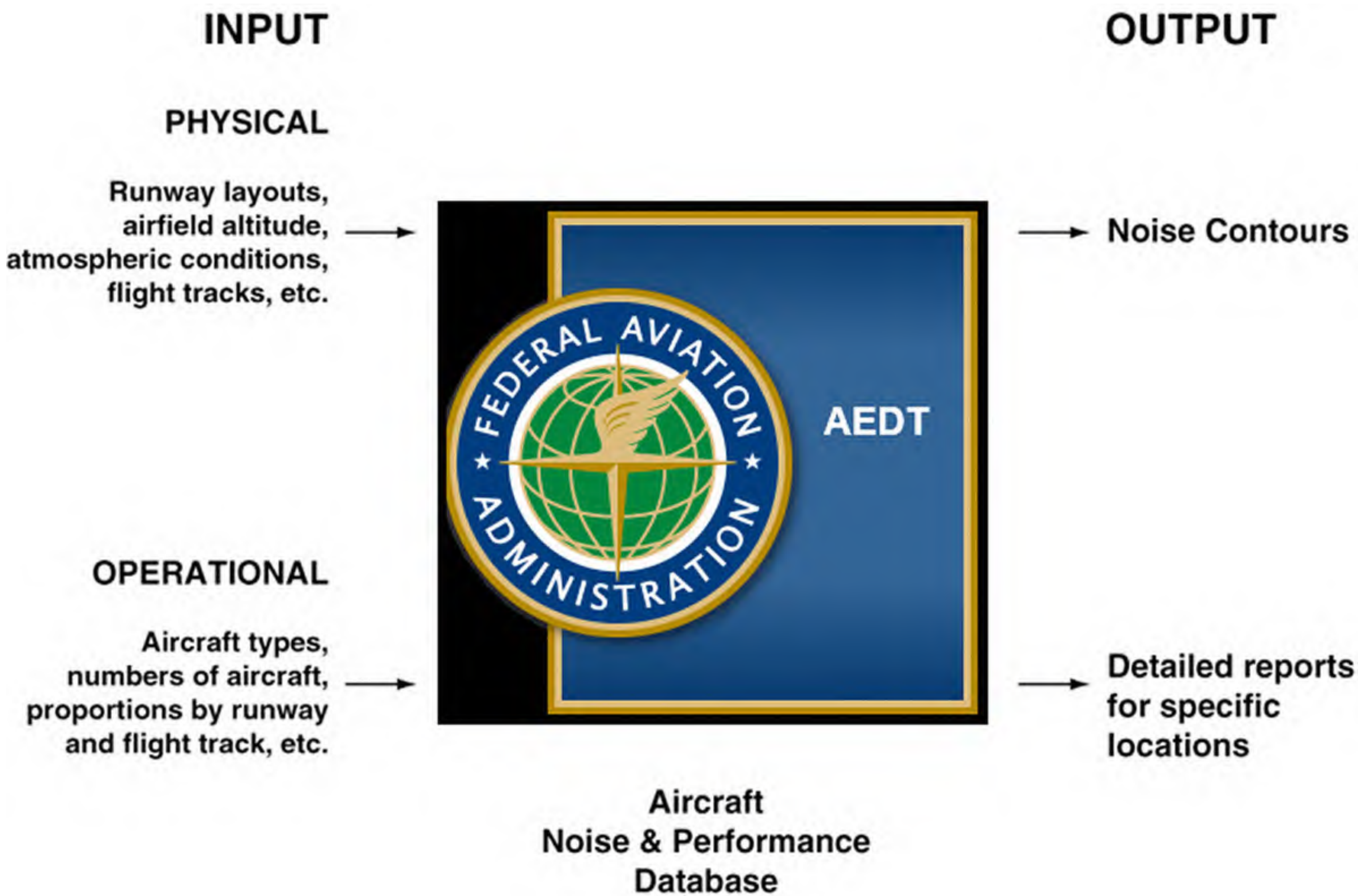
- Aircraft noise modeling allows:
  - Calculation of aircraft noise exposure at any location
  - Illustration of annual average aircraft noise exposure
  - Forecast of future aircraft noise exposure
  - Evaluation of changes in noise impacts due to changes in runway configuration or use
  - Evaluation of changes in aircraft fleet mix and/or number of operations
  - Assessment of operational procedures

- Aviation Environmental Design Tool (AEDT) replaced the Integrated Noise Model (INM) when it was released in 2015. The current version, AEDT 3d, is being used for this 14 CFR Part 150 NEM Update study.



SOURCE: Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT): Version 3d Technical Manual,* March 2021.

Noise Model Methodology – How it Works



SOURCE: Federal Aviation Administration

Noise Model Methodology - Inputs

- Inputs affecting the size of the contour include:
  - Operation Levels – User input
  - Aircraft Fleet Mix – User input based on AEDT aircraft database
  - Time of Day Distribution – User input
  - Aircraft Performance Characteristics – AEDT or FAA-approved user defined data

- Inputs affecting the shape of the contour/distribution of noise exposure include:
  - Runway Use – User input
  - Flight Track Locations and Use – User input

Average Annual Itinerant Operations & Time of Day

- **Itinerant** – operations that land at an airport, arriving from outside the airport area, or departs an airport and leaves the airport area

- **Existing – 2019 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**TOTAL**
Heavy Jet [1]	3.24	0.09	3.34	2.78	0.56	3.34	**6.67**
Large and Small Jets [2 3]	35.07	9.06	44.14	35.27	8.87	44.14	**88.27**
Piston/Turboprop	13.63	5.86	19.49	13.70	5.80	19.49	**38.99**
Military	1.72	0.57	2.29	1.97	0.32	2.29	**4.59**
Helicopter	82.73	2.50	85.22	82.73	2.50	85.22	**170.45**
TOTAL ITINERANT OPERATIONS [6]	**136.39**	**18.09**	**154.48**	**136.44**	**18.04**	**154.48**	**308.97**

- **Future – 2027 (DRAFT)**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**DAY [4]**	**NIGHT [5]**	**TOTAL**	**TOTAL**
Heavy Jet [1]	1.86	0.14	2.00	1.63	0.37	2.00	**4.00**
Large and Small Jets [2 3]	44.32	11.33	55.65	44.68	10.98	55.66	**111.31**
Piston/Turboprop	15.34	7.27	22.61	15.41	7.20	22.61	**45.22**
Military	1.85	0.62	2.46	2.12	0.34	2.46	**4.92**
Helicopter	90.43	2.73	93.16	90.43	2.73	93.16	**186.32**
TOTAL ITINERANT OPERATIONS	**153.79**	**22.10**	**175.88**	**154.26**	**21.63**	**175.89**	**351.78**

NOTES:

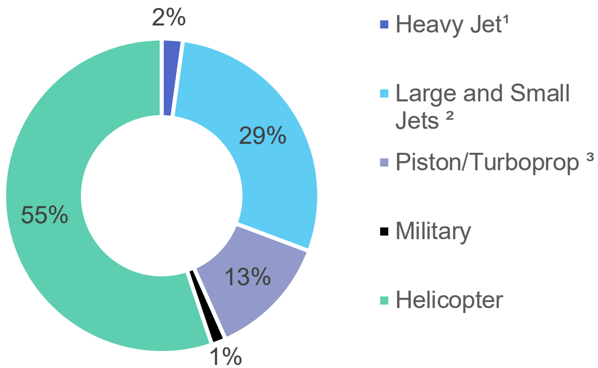
1 Heavy Jet - Aircraft weighing more than 255,000 pounds
2 Large Jet - Aircraft weighing more than 41,000 and up to 255,000 pounds
3 Small Jet – Aircraft weighing less than 41,000 pounds
4 Day = 7:00 a.m. to 9:59 p.m.
5 Night = 10:00 p.m. to 6:59 a.m.
6 Totals may not add due to rounding.

SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

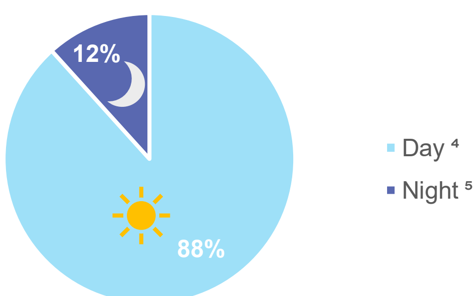
Average Annual Itinerant Operations & Time of Day

Existing – 2019

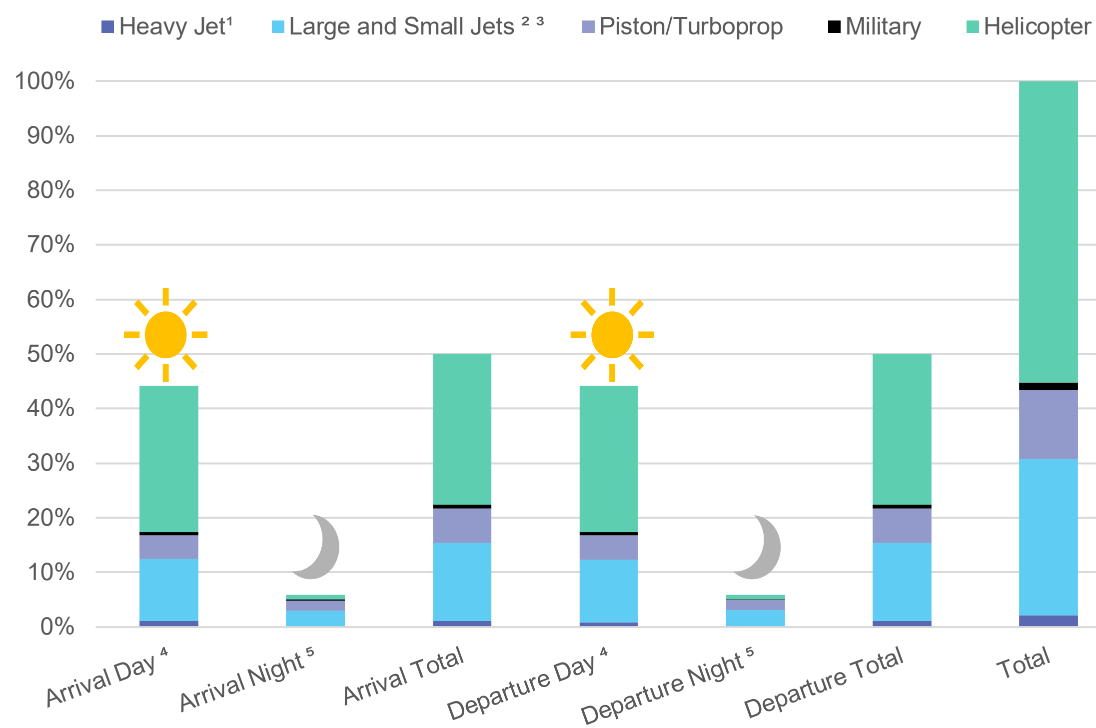
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



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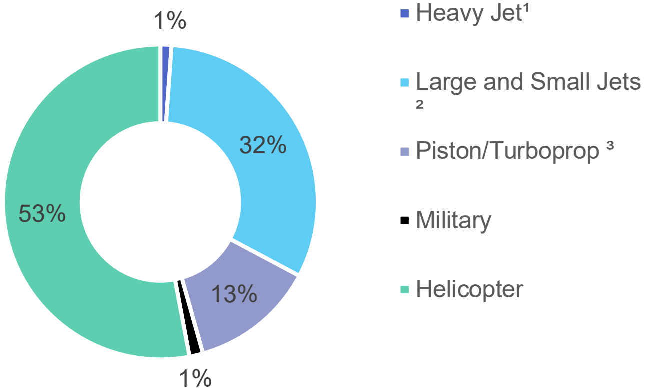
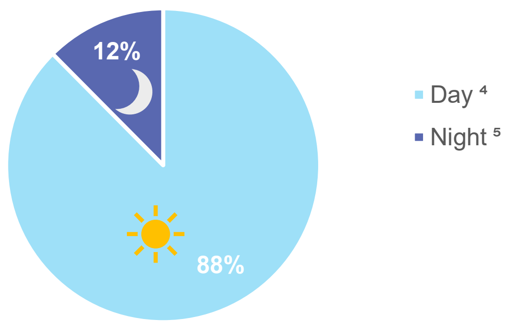
Average Annual Itinerant Operations & Time of Day

Future – 2027

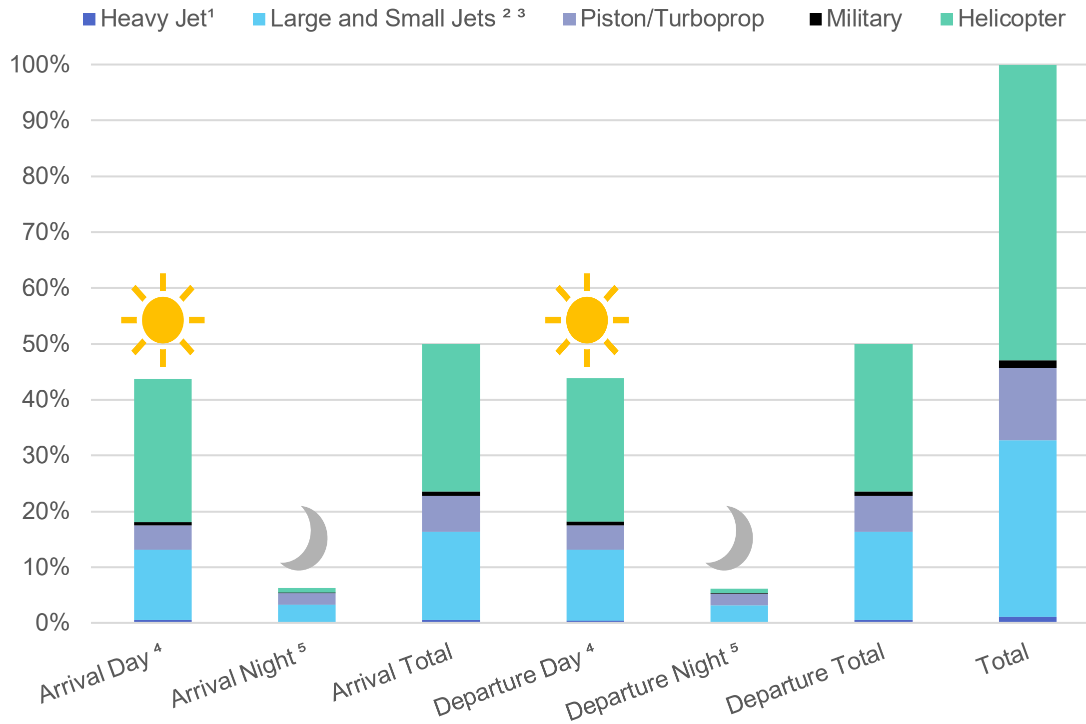
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



NOTES:

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2 Large Jet - Aircraft weighing more than 41,000 and up to 255,000 pounds
3 Small Jet – Aircraft weighing less than 41,000 pounds
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SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

Average Annual Local Operations & Time of Day

- **Local** – operations that remain in the local traffic pattern
- **Existing – 2019**

	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [3]	NIGHT [4]	TOTAL	DAY [3]	NIGHT [4]	TOTAL	TOTAL
General Aviation Jet [1]	1.46	0.76	2.22	1.46	0.76	2.22	**4.45**
Piston/Turboprop	4.76	2.58	7.34	4.76	2.58	7.34	**14.68**
Military [2]	0.50	0.00	0.50	0.50	0.00	0.50	**1.00**
Helicopter	8.92	0.27	9.19	8.92	0.27	9.18	**18.37**
TOTAL LOCAL OPERATIONS [5]	**15.64**	**3.61**	**19.25**	**15.64**	**3.61**	**19.25**	**38.50**

- **Future – 2027**

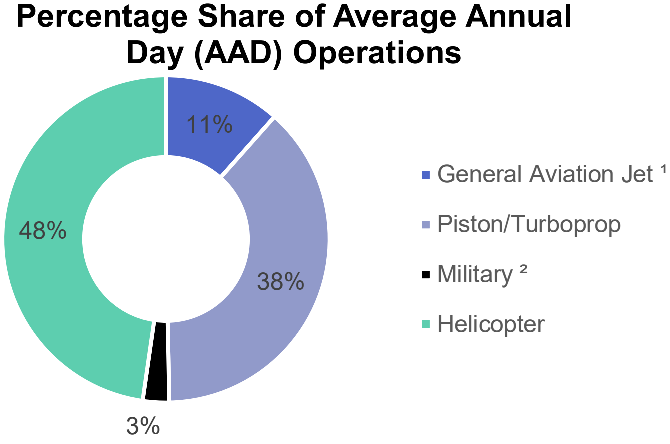
	ARRIVAL			DEPARTURE			
AIRCRAFT CATEGORIES	DAY [3]	NIGHT [4]	TOTAL	DAY [3]	NIGHT [4]	TOTAL	TOTAL
General Aviation Jet [1]	1.82	0.96	2.77	1.82	0.96	2.77	**5.54**
Piston/Turboprop	5.74	3.11	8.86	5.74	3.11	8.86	**17.71**
Military [2]	0.58	0.00	0.58	0.58	0.00	0.58	**1.15**
Helicopter	10.73	0.32	11.06	10.73	0.32	11.06	**22.11**
TOTAL LOCAL OPERATIONS [5]	**18.86**	**4.39**	**23.26**	**18.86**	**4.39**	**23.26**	**46.52**

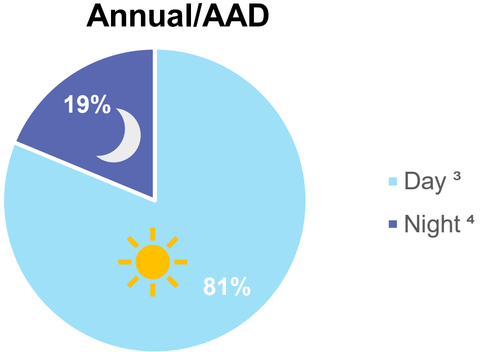
NOTES:
1 General Aviation Jet – Non-commercial jet aircraft.
2 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories,
3 Day = 7:00 a.m. to 9:59 p.m.
4 Night = 10:00 p.m. to 6:59 a.m.
5 Totals may not add due to round

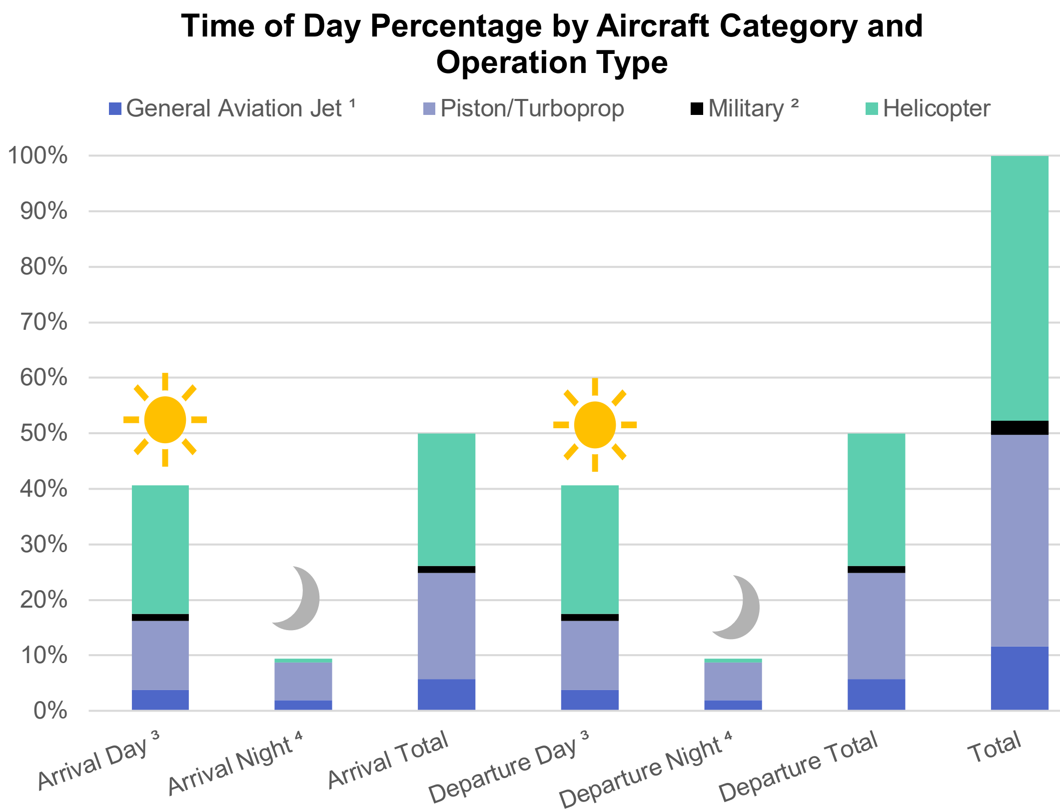
SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

Average Annual Local Operations & Time of Day

Existing – 2019







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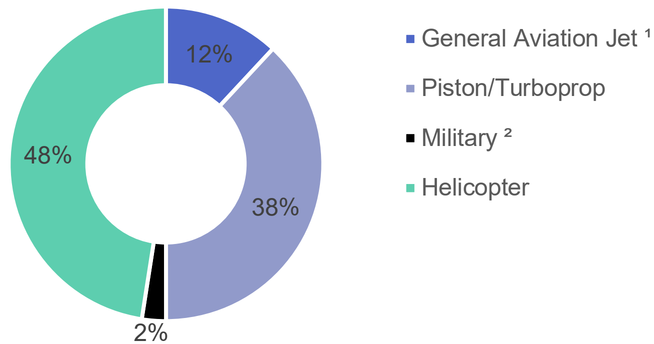
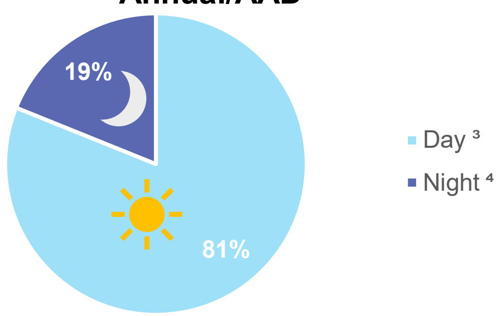
Average Annual Local Operations & Time of Day

➢ Future – 2027

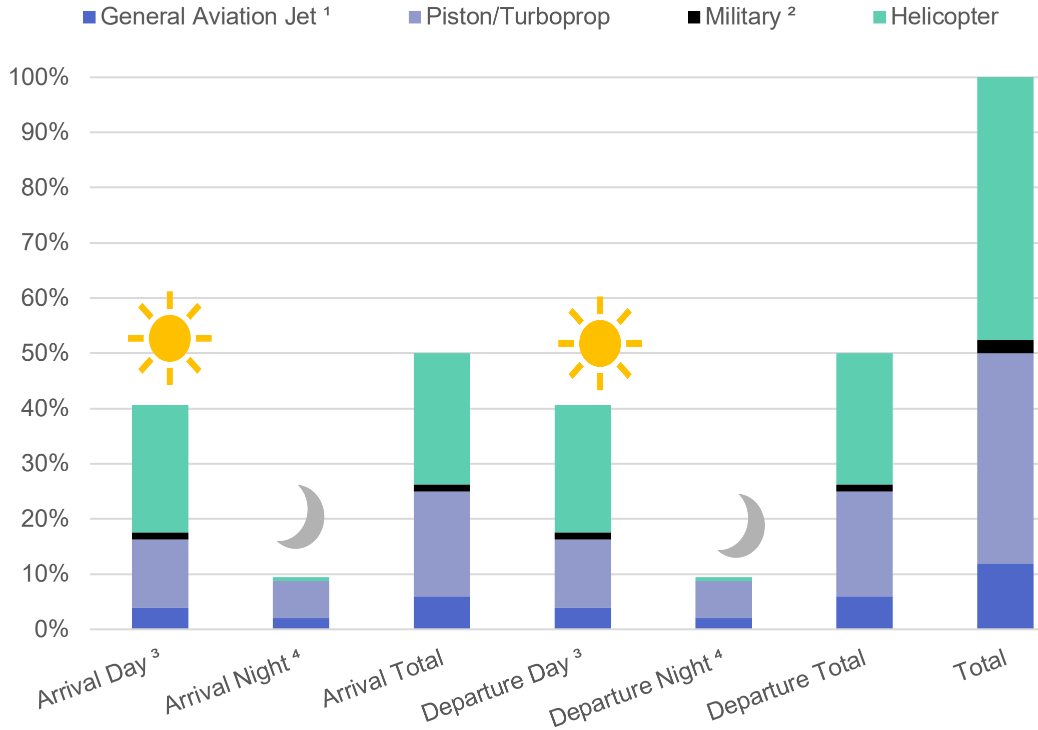
Percentage Share of Average Annual Day (AAD) Operations



Annual/AAD



Time of Day Percentage by Aircraft Category and Operation Type



NOTES:

1 General Aviation Jet – Non-commercial jet aircraft.

2 Civilian-type aircraft operated by military and government agencies are included in the large jet, small jet, and prop/turboprop categories,

3 Day = 7:00 a.m. to 9:59 p.m.

4 Night = 10:00 p.m. to 6:59 a.m.

5 Totals may not add due to round

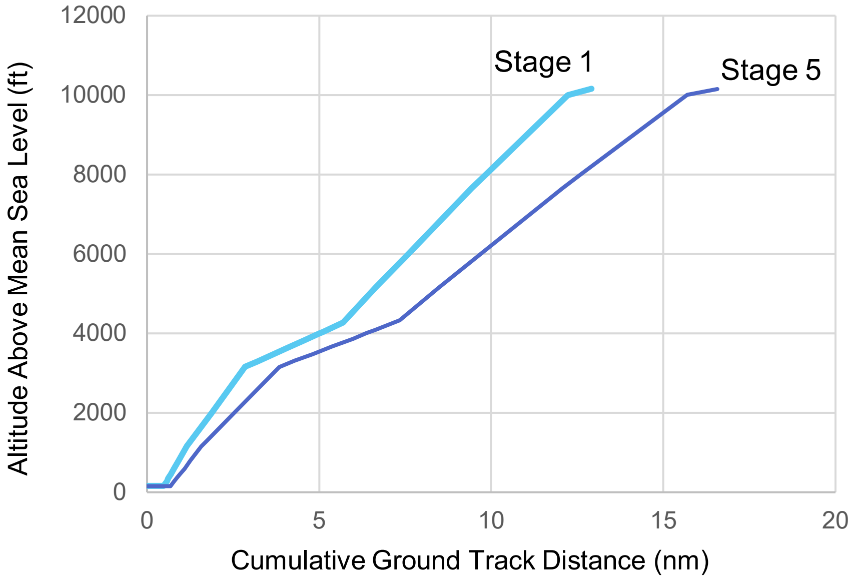
SOURCES: US Department of Transportation, Federal Aviation Administration, Operations Network (OPSNET), https://aspm.faa.gov/opsnet/sys/Airport.asp (accessed March 10, 2021; Airport operations); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts, Lihue Airport*, March 2020; State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Runway Safety Area Improvements – Final Environmental Assessment,* March 2018.

Noise Model Methodology – Stage Length

- Departure flight distance from airport to destination

STAGE LENGTH CATEGORIES	
CATEGORY	STAGE LENGTH (NAUTICAL MILES)
1	0 – 500
2	500 – 1,000
3	1,000 – 1,500
4	1,500 – 2,500
5	2,500 – 3,500
6	3,500 – 4,500
7	4,500 – 5,500
8	5,500 – 6,500
9	6,500 +

Example: Stage Length Comparison for Boeing 717-200



- Composite Stage Length Distribution for Commercial Aircraft

	STAGE LENGTH					
YEAR	1	2	3	4	5	TOTAL
EXISTING - 2019	63.32%	0.00%	0.00%	33.53%	3.15%	100.00%
FUTURE - 2027	59.25%	0.00%	0.00%	37.42%	3.33%	100.00%

SOURCES: Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT): Version 3d Technical Manual,* March 2021 (stage length categories); Ricondo & Associates, Inc., December 2016. (runway use percentage for local operations); Diio Mi, October 2021 (ATCT operation counts from FAA's OPSNET and Innovata schedule); Ricondo & Associates, Inc., *Lihue Master Plan and Noise Exposure Map Update: Aviation Activity Forecasts*, March 2021; Ricondo & Associates, Inc., October 2021 (stage length comparison for Boeing 717-200).

Noise Model Methodology – Runway Use

Itinerant Operations
2019 & 2027

LEGEND

Arrivals

Departures

NOTES:
1 Daytime = 7:00 a.m. to 9:59 p.m.
2 Nighttime = 10:00 p.m. to 6:59 a.m.
3. Totals do not add up due to rounding

SOURCES: Woolpert, August 2019 (aerial imagery); State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative - LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Runway Use

Local Operations
2019 & 2027

LEGEND

Arrivals

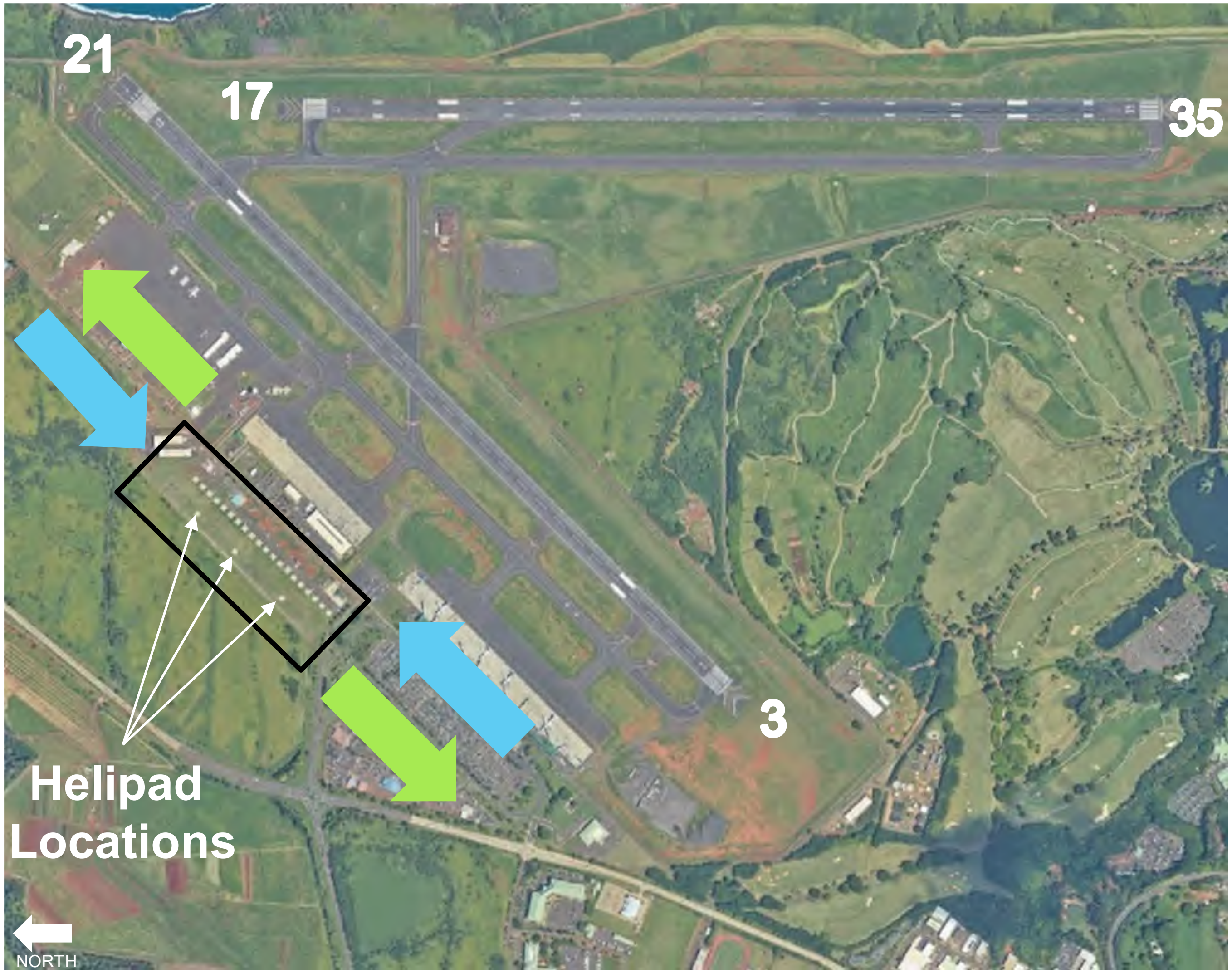
Departures

NOTES:
1 Daytime = 7:00 a.m. to 9:59 p.m.
2 Nighttime = 10:00 p.m. to 6:59 a.m.
3. Totals do not add up due to rounding

SOURCES: Woolpert, August 2019 (aerial imagery); State of Hawaii Department of Transportation – Airports Division, *Runway 3-21 Safety Area Improvements at Lihue Airport, Safety Risk Management,* August 15, 2016; Ricondo & Associates, Inc., *Comments from Airline Committee of Hawaii to DOT-A's Preferred Alternative - LIH Runway 3-21 RSA*, December 2016; Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Helipad Use

- Three helipads
- Modeled as one helipad



LEGEND

Primary Arrivals

Primary Departures

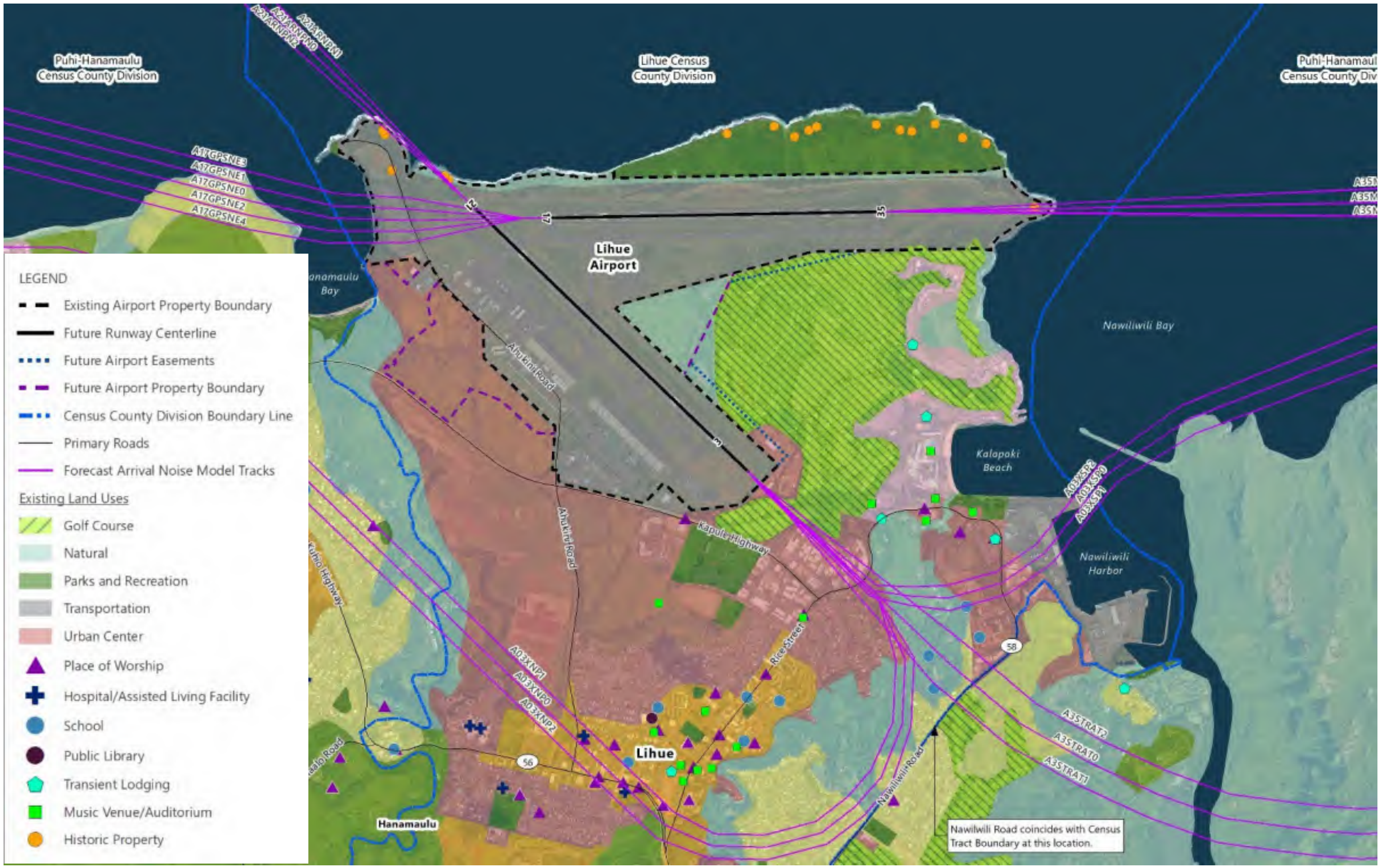
SOURCES: Woolpert, August 2019 (aerial imagery); Ricondo & Associates, Inc., October 2021 (analysis).

Noise Model Methodology – Flight Tracks

Generalized Fixed-Wing

NORTH

Arrivals



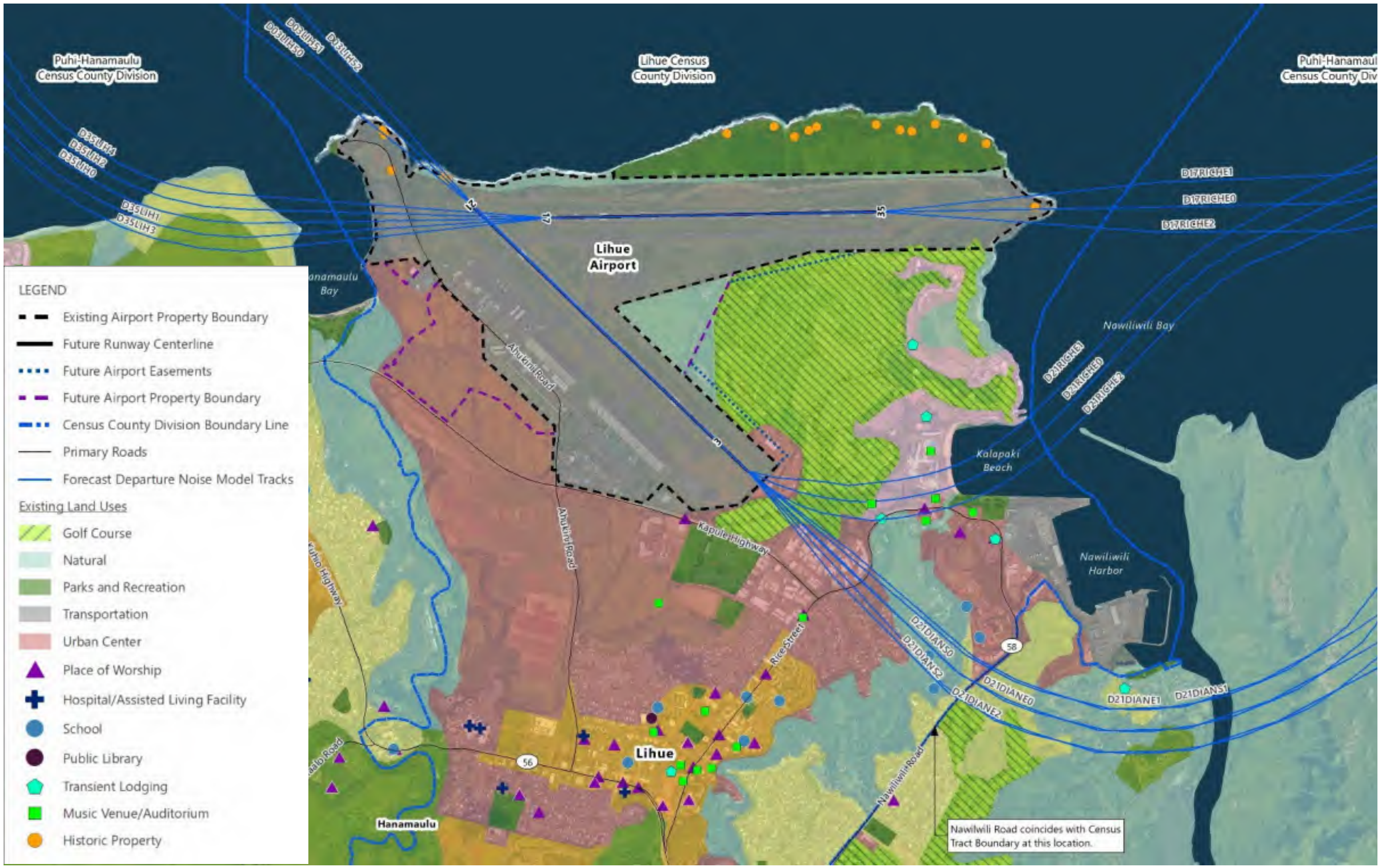
SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022.

Noise Model Methodology – Flight Tracks

Generalized Fixed-Wing

NORTH

Departures



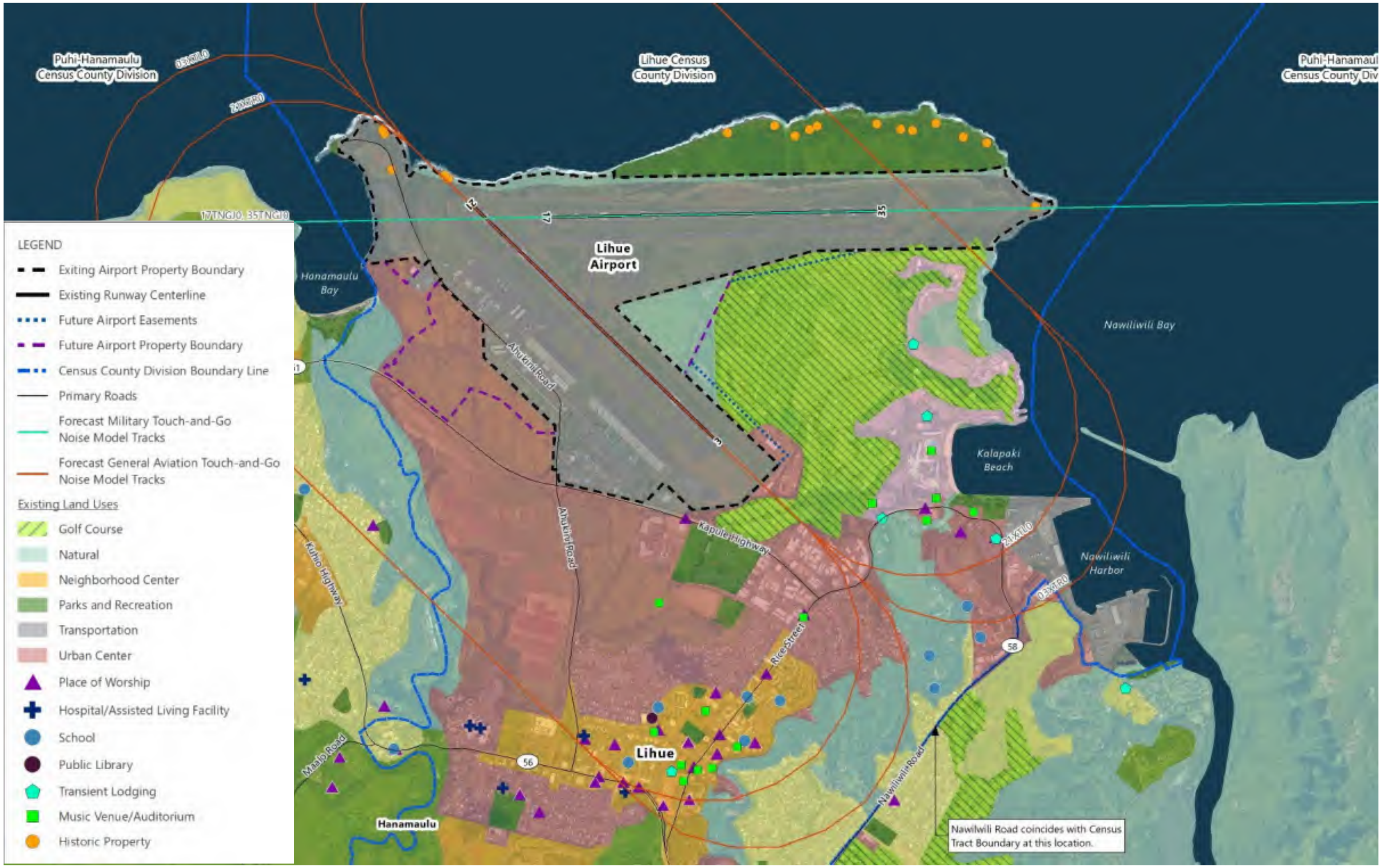
SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022.

Noise Model Methodology – Flight Tracks

Generalized Fixed-Wing/Military

NORTH

Touch-and-Go



SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022.

Noise Model Methodology – Flight Tracks

Generalized Helicopter

NORTH

Arrivals and Departures and Touch-and-Go

SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022.

Land Use Compatibility

Land Use Compatibility – FAA

Land use	Yearly day-night average sound level (Ldn) [DNL] in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail -- building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade – general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps.	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation.	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NLR: Noise Level Reduction

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Notes for Table 1

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Source: 14 CFR Part 150, Appendix A, Table 1. [Bracketed material and color added by Ricondo & Associates, Inc.]

Land Use Compatibility – State of Hawaii

LAND USE	YEARLY DAY-NIGHT NOISE LEVEL (DNL) IN DECIBELS					
	BELOW 60	60-65	65-70	70-75	75-80	80-85
Residential						
Low density residential, resorts, and hotels (outdoor facility)	Y(1)	N(2)	N	N	N	N
Low density apartment with moderate outdoor use	Y	N(2)	N	N	N	N
High density apartment with limited outdoor use	Y	N(2)	N(2)	N	N	N
Transient lodgings with limited outdoor use	Y	N(2)	N(2)	N	N	N
Public Use						
Schools, day-care centers, libraries, and churches	Y	N(3)	N(3)	N(3)	N	N
Hospitals, nursing homes, clinics, and health facilities	Y	Y(4)	Y(4)	Y(4)	N	N
Indoor auditoriums and concert halls	Y(3)	Y(3)	N	N	N	N
Governmental services and office buildings serving the general public	Y	Y	Y(4)	Y(4)	N	N
Transportation and parking	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Commercial Use and Government Use						
Offices – government, business ,and professional	Y	Y	Y(4)	Y(4)	N	N
Wholesale and retail--building materials, hardware, and heavy equipment	Y	Y	Y(4)	Y(4)	Y(4)	Y(4)
Airport businesses – car rental, tours, lei stands, ticket offices, etc.	Y	Y	Y(4)	Y(4)	N	N
Retail, restaurants, shopping centers, financial institutions, etc.	Y	Y	Y(4)	Y(4)	N	N
Power plants, sewage treatment plants, and base yards	Y	Y	Y(4)	Y(4)	Y(4)	N
Studios without outdoor sets, broadcasting, production facilities, etc.	Y(3)	Y(3)	N	N	N	N
Manufacturing, Production, and Storage						
Manufacturing, general	Y	Y	Y(4)	Y(4)	Y(4)	N
Photographic and optical	Y	Y	Y(4)	Y(4)	N	N
Agriculture (except livestock) and forestry	Y	Y(5)	Y(5)	Y(5)	Y(5)	Y(5)
Livestock farming and breeding	Y	Y(5)	Y(5)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(6)	Y(6)	N	N	N
Outdoor music shells, amphitheaters	Y(6)	N	N	N	N	N
Nature exhibits and zoos, neighborhood parks	Y	Y	N	N	N	N
Amusements, beach parks, active playgrounds, etc.	Y	Y	Y	Y	N	N
Public golf courses, riding stables, cemeteries, gardens, etc.	Y	N	N	N	N	N
Professional/resort sport facilities, locations of media events, etc.	Y(6)	N	N	N	N	N
Extensive natural wildlife and recreation areas	Y(6)	N	N	N	N	N

Numbers in parentheses refer to notes

LEGEND

Y	Compatible without restrictions
Y or ##	Generally compatible with NLR measures
N (#)	Not compatible, but if allowed NLR measures required
N	Not compatible and should be prohibited

NOTES:

Y – yes, land use and related structures are compatible without restrictions.

N – no, land use and related structures are not compatible and should be prohibited.

(1) A noise level 60 DNL does not eliminate all risks of adverse noise impacts from aircraft noise. However, the 60 DNL planning level has been selected by the Hawaii State Department of Transportation – Airports Division as an appropriate compromise between the minimal risk level of 55 DNL and significant risk level of 65 DNL.

(2) Where the community determines that these uses must be allowed, Noise Level Reduction (NLR) measures to achieve interior levels of 45 DNL or less should be incorporated into building codes and be considered in individual approvals. Normal local construction employing natural ventilation can be expected to provide an average NLR, and will not eliminate outdoor noise problems.

(3) Because of the DNL noise descriptor system represents a 24-hour average of individual aircraft noise events, each of which can be unique in respect to amplitude, duration, and tonal content, the NLR requirements should be evaluated for the specific land use, interior acoustical requirements, and properties of the aircraft noise events. NLR requirements should not be based solely upon the exterior DNL exposure level.

(4) Measures to achieve required NLR must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

(5) Residential buildings require NLR. Residential buildings should not be located where noise is greater than 65 DNL.

(6) Impact of amplitude, duration, frequency, and tonal content of aircraft noise events should be evaluated.

SOURCE: State of Hawaii Department of Transportation – Airports Division, *Hilo International Airport FAR Part 150 Noise Exposure Map Report*, April 2013.

Land Use Compatibility – FAA vs. State of Hawaii

- Hawaii guidelines developed due to the outdoor life-style of the people and that majority of residences are naturally ventilated
- Considers land uses below DNL 60 dBA as compatible
- Utilizes DNL 55 dBA for the required buyer notification boundary

State Land Use Compatibility Table Changes to FAA Table

	TABLE SET UP	TABLE FOOTNOTES
1	Criteria of yearly DNL ranges are below DNL 60 TO DNL 85 in lieu of below DNL 65 to Over DNL 85.	Community determines residential uses to achieve NLR interior levels of DNL 45. Normal local construction can be expected to provide an average NLR of approximately 9 dBA.
2	Residential land use category is delineated into low density and high density.	NLR requirements should be evaluated and not be based solely upon the exterior DNL exposure level for schools, indoor auditoriums, concert halls, studios without outdoor sets, broadcasting, and production facilities.
3	Additional land use categories included under recreation: professional/resort sport facilities, locations of media events, extensive natural wildlife, and recreation areas	No indication of dBA measurement to achieve required NLR for the design and construction of buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

NOTE: NLR – Noise Level Reduction
SOURCE: State of Hawaii Department of Transportation – Airports Division, *Lihue Airport Noise Compatibility Program: Volume 1-Noise Exposure Map Report*, May 1989.

Existing Land Use Map

SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022

Existing Zoning Map

SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022

Off-Airport Future Developments Map

SOURCE: Hawaii Department of Transportation – Airports Division, *Title 14, Code of Federal Regulations, Part 150 Airport Noise Compatibility Planning Noise Exposure Map Update*, April 2022

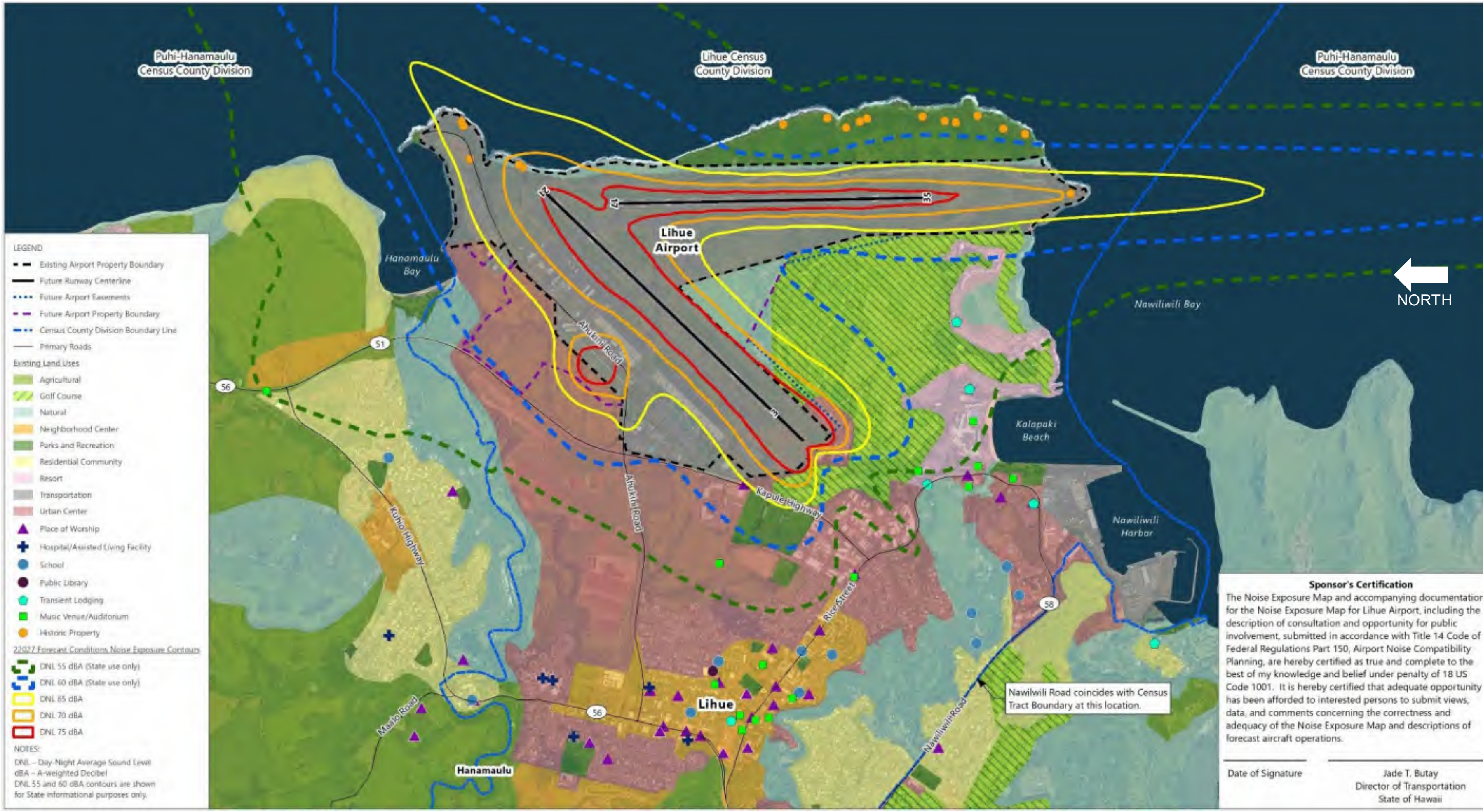
Results

2019 Existing Condition NEM

2019 NEM – Incompatible Uses

- **FAA Guidelines**
  - Golf Course – 10 acres in DNL 70+ dBA contour (no indoor facilities in area)
  - Natural Land – 24 acres in DNL 70+ dBA contour
- **State of Hawaii Guidelines**
  - Golf Course – 132 acres in DNL 60+ dBA contour
  - Resort – 4 acres in DNL 60+ dBA contour (includes structures associated with Kauai Lagoons Marina at Marriott's Kauai Lagoons Kalanipu‘u)
  - Natural Land – 94 acres in DNL 60+ dBA contour
  - 1 Place of Worship in DNL 60+ dBA contour

2027 Forecast Conditions NEM



2027 NEM – Incompatible Uses

- **FAA Guidelines**
  - Golf Course – 12 acres in DNL 70+ dBA contour (no indoor facilities in area)
  - Natural Land – 23 acres in DNL 70+ dBA contour
- **State of Hawaii Guidelines**
  - 6 residential units in DNL 60+ dBA contour (approximately 18 residents)
  - 1 place of worship in DNL 60+ dBA contour
  - Golf Course – 184 acres in DNL 60+ dBA contour
  - Resort – 8 acres in DNL 60+ dBA contour (includes structures associated with Kauai Lagoons Marina at Marriott’s Kauai Lagoons Kalanipu‘u)
  - Natural Land – 103 acres in DNL 60+ dBA contour

2019 and 2027 NEM – Historic Properties Located in the DNL 60+ dBA Noise Contour

STATE INVENTORY OF HISTORICS PLACES NUMBER	SITE TYPE	FUNCTION	DESCRIPTION	LOCATED WITHIN NOISE EXPOSURE CONTOUR	LAND USE DESIGNATION	LAND USE COMPATIBILITY PER FAA GUIDELINES	LAND USE COMPATIBILITY PER STATE OF HAWAII GUIDELINES
50-30-11-2087	Nawiliwili Harbor Light, Wall Remnants, and Building Foundations	Lighthouse and Associated Remnants of Caretaker's Quarters	Series of features interpreted as being associated with Nawiliwili Harbor Light	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2096	Ditch	Drainage	Concrete drainage ditch	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2097	Ditch	Drainage	Concrete drainage ditch	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-11-2103	Structural Foundations	Industrial Complex	Remnants of five foundations associated with a historic industrial complex present near Ahukini Landing	DNL 65 dBA	Transportation	Compatible	Compatible
50-30-08-3958	Enclosures and Related Structures	Animal Husbandry	Piggery dating from the plantation era	DNL 70 dBA	Natural	Incompatible [1]	Incompatible [2]
	Enclosures and Related Structures	Animal Husbandry	Piggery dating from the plantation era	DNL 70 dBA	Natural	Incompatible [1]	Incompatible [2]

NOTES:

Historic properties are those that are listed in or eligible for listing in the National Register of Historic Places.

1 Although a historic property may be located in an area that is considered incompatible by FAA guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places. Natural land uses are most closely related to "Nature exhibits and zoos" in Title 14 Code of Federal Regulations Part 150 land use compatibility guidelines. Per FAA guidelines, these uses are considered incompatible at DNL 70 dBA and higher.

2 Although a historic property may be located in an area that is considered incompatible by the State of Hawaii recommended guidelines, this does not necessarily mean the historic property would be impacted or that it affects its eligibility for listing in the National Register of Historic Places. Natural land uses are most closely related to "Nature exhibits and zoos, neighborhood parks" and "Extensive natural wildlife and recreation areas" in State of Hawaii land use compatibility guidelines. Per State of Hawaii guidelines, these uses are considered incompatible at DNL 70 dBA and higher.

dBA – A-Weighted Decibels

DNL – Day-Night Average Sound Level

FAA – Federal Aviation Administration

SOURCES: Monahan, Chris, Ph.D., and Hallett H. Hammatt, Ph.D., *Archaeological Literature Review and Field Inspection Report for the Nawiliwili-Ahukini Bike Path Project, Nawiliwili, Kalapaki and Hanama'ulu Ahupua'a, Lihu'e District, Kaua'I Island*, July 2008; Wilson Okamoto Corporation and State of Hawaii Department of Transportation – Airports Division, *Final Environmental Impact Statement, Lihue Airport Improvements*, November 2007; Appendix A of this Study.

2019 and 2027 NEM – Supplemental Information

- Plot of the DNL 55 dBA contour is for informational purposes only
- All uses between the DNL 55 and 60 dBA noise contours are considered compatible by FAA and State of Hawaii guidelines
- State of Hawaii requires use of the DNL 55 dBA as a property buyer notification boundary

2019: 994 acres within the DNL 55 dBA contour area

2027: 1,141 acres within the DNL 55 dBA contour area

Next Steps

Next Steps

- Receive comments on Draft NEM Update Report up to May 16, 2022
- Finalize Draft NEM Update Report
- Submit Draft NEM Update Report to FAA for Review and Acceptance

Public Comment and Questions and Answers Session

The presentation ended at 7:10 PM

We will remain online until 8:00 PM

APPENDIX D.6

Public Meeting #2 Legal Advertisement and Affidavit of Publication

AFFIDAVIT OF PUBLICATION

IN THE MATTER OF
LEGAL NOTICE

STATE OF HAWAII } SS.
City and County of Honolulu }

Doc. Date:	APR 20 2022	**# Pages:**	1
Notary Name:	COLLEEN E. SORANAKA	First Judicial **Circuit**	
Doc. Description:	Affidavit of Publication		
Notary Signature	APR 20 2022	Date	

COLLEEN E. SORANAKA NOTARY PUBLIC No. 90-263 STATE OF HAWAII

Lisa Sakakida being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of Oahu Publications, Inc. publisher of The Honolulu Star-Advertiser, MidWeek, The Garden Island, West Hawaii Today, and Hawaii Tribune-Herald, that said newspapers are newspapers of general circulation in the State of Hawaii, and that the attached notice is true notice as was published in the

Honolulu Star-Advertiser 0 times on:

MidWeek 0 times on:

The Garden Island 2 times on:
04/17, 04/20/2022

Hawaii Tribune-Herald 0 times on:

West Hawaii Today 0 times on:

Other Publications: 0 times on:

And that affiant is not a party to or in any way interested in the above entitled matter.

Lisa Sakakida

Subscribed to and sworn before me this 20th day of April A.D. 20 22

Colleen E. Soranaka, Notary Public of the First Judicial Circuit, State of Hawaii
My commission expires: Jan 06 2024

Ad # 0001368131

COLLEEN E. SORANAKA NOTARY PUBLIC No. 90-263 STATE OF HAWAII

ICSP NO.:

LEGAL NOTICE

NOTICE OF PUBLIC INFORMATION MEETING
LIHUE AIRPORT NOISE EXPOSURE MAP UPDATE

Date: Thursday, May 5, 2022
Time: 6:00 pm - 8:00pm HST
Location: Via Zoom Video Conferencing
https://ricondo.zoom.us/webinar/register/WN_jtaolZtfTAqcFw4cWOxX9A
Meeting ID: 97015115610
877 853 5257 US Toll-free, or
888 475 4499 US Toll-free

The Hawaii Department of Transportation (HDOT), Airports Division is conducting the second of two public information meetings for the Lihue Airport Noise Exposure Map (NEM) Update Study. The Study will update the NEMs that are used to evaluate land use compatibility with Lihue Airport.

The purpose of this second public information meeting is to afford agencies and the general public an opportunity to comment on the Draft NEM Report. The Draft NEM Report is available for download on the study documentation webpage located at: https://www.lihmasterplan.com/documentation/

Please note that this meeting will be held virtually.

Members of the public are encouraged to submit written comments on the Draft NEM Report via the study website https://www.lihmasterplan.com/stay-informed/ at the bottom of the page in the "Questions or Comments?" field, or in writing to:

Hawaii Department of Transportation
– Airports Division
Attn: Mr. Raymond Severn
400 Rodgers Blvd. Suite 700
Honolulu, Hawaii 96819

Comments must be received by 5:00 p.m. HST on May 16, 2022.

If you need an auxiliary aid/service or other accommodation due to a disability, or language interpretation for languages other than English, contact Mr. Raymond Severn by phone at 808-838-8817 or by email at raymond.s.severn@hawaii.gov by Monday, April 25, 2022. Requests made by this date will allow adequate time to fulfill your request. Upon request, this notice is available in alternate formats such as large print, Braille, or electronic copy.

JADE T. BUTAY
Director of Transportation
(TGI1368131 4/17, 4/20/22)

Notice #: 0001368131-01
Legal Notices
Start Date: April 17, 2022
End Date: April 20, 2022

LEGAL NOTICE
NOTICE OF PUBLIC INFORMATION MEETING
LIHUE AIRPORT NOISE EXPOSURE MAP UPDATE
Date: Thursday, May 5, 2022
Time: 6:00 pm – 8:00pm HST
Location: Via Zoom Video Conferencing
https://ricondo.zoom.us/webinar/register/WN_jtaolZtfTAqcFw4cWOxX9A
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838-8817 or by email at raymond.s.severn@hawaii.gov by Monday, April 25, 2022. Requests made by this date will allow adequate time to fulfill your request. Upon request, this notice is available in alternate formats such as large print, Braille, or electronic copy.

JADE T. BUTAY
Director of Transportation
(TGI1368131 4/17, 4/20/22)

APPENDIX D.7

Public Meeting #2 Comments Received

From: LIH Master Plan <no-reply@wufoo.com>
Sent: Tuesday, May 17, 2022 8:09 AM
To: Severn, Raymond S <raymond.s.severn@hawaii.gov>
Cc: Ura Yvan <uyvan@ricondo.com>
Subject: [EXTERNAL] Question or Comment from Peter McClaran

Name *	Peter McClaran
Email *	petermcclaran@gmail.com
My Phone Number	(808) 397-9242
Topic of Your Message *	Noise Exposure Map Questions or Comments

Message

Hello, Regarding noise exposure, I want to inform you that my residence at the Lihue Townhouse Apts. at 4156 is presently significantly impacted by the noise of the big jets taking off from Lihue Airport. So, looking at your project to extend the airport and blast area 1,000 feet closer to this area I am concerned that the level of noise will increase substantially. As the bird flies the current blast zone is about 4,000 feet away. With the change in the runway the blast area will be moved to within 3,000 feet. That is 25% closer to this residential area therefore we will likely experience a 25% increase in the noise level at this residence. This kind of increase in noise for this residential area has not been addressed. I would recommend that this potential increase in noise for the Lihue residential area be addressed and mitigated. The EIS for this project does not include this residential area in its study but the impact is substantial. Looking forward to a response.

APPENDIX D.8

Public Meeting #2
Website Announcement

Lihue Airport Master Plan

Home Process Stay Informed Documentation Resources FAQ About LIH

Stay Informed

Throughout the LIH Master Plan and Part 150 Noise Exposure Map Update process, a series of public meetings will be hosted to encourage information sharing and collaboration.

Register for Email Updates

Email

Name

First Last

Submit

Public Events

Master Plan Update

- Meeting #1 – October 30, 2019
- Meeting #2 – May 2022
- Meeting #3 – Summer 2022

Part 150 Noise Exposure Map Update

- Meeting #1 – October 28, 2021
  - View Video Recording of Meeting
  - View Presentation
- Meeting #2 – May 5, 2022

Questions or Comments?

Name

LEGAL NOTICE

NOTICE OF PUBLIC INFORMATION MEETING
LIHUE NOISE EXPOSURE MAP UPDATE

Date: Thursday, May 5, 2022
Time: 6:00 pm – 8:00pm HST
Location: Via Zoom Video Conferencing
https://ricondo.zoom.us/webinar/register/WN_jtaolZtfTAqcFw4cWOxX9A
Meeting ID: 97015115610
877 853 5257 US Toll-free, or
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Attn: Mr. Raymond Severn
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Honolulu, Hawaii 96819

Comments must be received by 5:00 p.m. HST on May 16, 2022.

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JADE T. BUTAY
Director of Transportation

Documentation

Master Plan Update

- Inventory Chapter
- Forecast Chapter
- Federal Aviation Administration Forecast Approval Letter
- Facility Requirements Chapter
- Alternative Development and Evaluation Chapter (In progress)
- Airport Development Plan Chapter
- Environmental Overview Chapter
- Capital Improvement Program and Implementation Plan Chapter
- Financial Feasibility and Funding Analysis Chapter

Part 150 Noise Exposure Map Update

- Draft Noise Exposure Map Update Report
- Draft Noise Exposure Map Update Report Appendices

Notice #: 0001368131-01
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If you need an auxiliary aid/service or other accommodation due to a disability, or language interpretation for languages other than English, contact Mr. Raymond Severn by phone at 808-838-8817 or by email at raymond.s.severn@hawaii.gov by Monday, April 25, 2022. Requests made by this date will allow adequate time to fulfill your request. Upon request, this notice is available in alternate formats such as large print, Braille, or electronic copy.

JADE T. BUTAY
Director of Transportation
(TGI1368131 4/17, 4/20/22)

APPENDIX E

Part 150 Noise Exposure Checklist – Part 1

PART 150 NOISE EXPOSURE MAP CHECKLIST – PART I

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES / REVIEW COMMENTS
I. Submitting and Identifying The NEM:			
A. Submission is properly identified:			
1. 14 C.F.R. Part 150 NEM?	✔		Chapter 1, page 1-1
2. NEM and NCP together?		✔	NEM submittal only
3. Revision to NEMs FAA previously determined to be in compliance with Part 150?	✔		Chapter 1, page 1-1
B. Airport and Airport Operator's name are identified?	✔		Chapter 1, page 1-1
C. NCP is transmitted by airport operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?		✔	No NCP submitted – Not applicable
II. Consultation: [150.21(b), A150.105(a)]			
A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?	✔		Chapter 4, pages 4-1 to 4-2
B. Identification of consulted parties:			
1. Are the consulted parties identified?	✔		Chapter 4, Table 4.1-1, page 4-2
2. Do they include all those required by 150.21(b) and A150.105(a)?	✔		Chapter 4, Table 4.1-1, page 4-2
3. Agencies in 2., above, correspond to those indicated on the NEM?	✔		Chapter 4, Table 4.1-1, page 4-2
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?	✔		Sponsor's Certification, page i Appendix C Appendix D
D. Does the document indicate whether written comments were received during consultation and, if there were comments, that they are on file with the FAA regional airports division manager?	✔		Chapter 4, pages 4-1 to 4-2 Appendix D
III. General Requirements: [150.21]			
A. Are there two maps, each clearly labeled on the face with year (existing condition year and one that is at least 5 years into the future)?	✔		Exhibit NEM-1, page ii Exhibit NEM-2, page iii Chapter 3, Exhibit 3.1-1, page 3-2 Chapter 3, Exhibit 3.2-1, page 3-7
B. Map currency:			
1. Does the year on the face of the existing condition map graphic match the year on the airport operator's NEM submittal letter?		✔	Cover letter Exhibit NEM-1, page ii Chapter 1, Section 1.3.1.1, pages 1-2 to 1-4 Chapter 3, Exhibit 3.1-1, page 3-2 Appendix B
2. Is the forecast year map based on reasonable forecasts and other planning assumptions and is it for at least the fifth calendar year after the year of submission?	✔		Exhibit NEM-2, page iii Chapter 1, Section 1.3.1.2, pages 1-4 to 1-6 Chapter 3, Exhibit 3.2-1, page 3-7 Appendix B
3. If the answer to 1 and 2 above is no, the airport operator must verify in writing that data in the documentation are representative of existing condition and at least 5 years' forecast conditions as of the date of	✔		Chapter 1, pages 1-1 to 1-6 Appendix B

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES / REVIEW COMMENTS
submission?			
C. If the NEM and NCP are submitted together:		✔	See I.A.2 above
1. Has the airport operator indicated whether the forecast year map is based on either forecast conditions without the program or forecast conditions if the program is implemented?	n/a	n/a	
2. If the forecast year map is based on program implementation:			
a. Are the specific program measures that are reflected on the map identified?	n/a	n/a	
b. Does the documentation specifically describe how thesemeasures affect land use compatibilities depicted on the map?	n/a	n/a	
3. If the forecast year NEM does not model program implementation,the airport operator must either submit a revised forecast NEM showing program implementation conditions [B150.3(b), 150.35(f)] or the sponsor must demonstrate the adopted forecast year NEM with approved NCP measures would not change by plus/minus 1.5 DNL? (150.21(d))	n/a	n/a	
IV. Map Scale, Graphics, and Data Requirements: [A150.101, A150.103, A150.105, 150.21(a)]			
A. Are the maps of sufficient scale to be clear and readable (they mustnot be less than 1" to 2,000'), and is the scale indicated on the maps? (*Note (1) if the submittal uses separate graphics to depict flight tracksand/or noise monitoring sites, these must be of the same scale, because they are part of the documentation required for NEMs*.) (*Note (2) supplemental graphics that are not required by the regulationdo not need to be at the 1" to 2,000' scale*)	✔		Exhibit NEM-1, page ii Exhibit NEM-2, page iii Chapter 3, Exhibit 3.1-1, page 3-2 Chapter 3, Exhibit 3.2-1, page 3-7
B. Is the quality of the graphics such that required information is clear and readable? (*Refer to C. through G., below, for specific graphic depictions that must be clear and readable*)	✔		
C. Depiction of the airport and its environs:			
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps?			
a. Airport boundaries	✔		
b. Runway configurations with runway end numbers	✔		
2. Does the depiction of the off-airport data include?			
a. A land use base map depicting streets and other identifiable geographic features	✔		
b. The area within the DNL 65 dB (or beyond, at local discretion)	✔		
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65dB (or beyond, at local discretion)	✔		
D. 1.Continuous contours for at least the DNL 65, 70, and 75 dB?	✔		
2. Has the local land use jurisdiction(s) adopted a lower local standard and if so, has the sponsor depicted this on the NEMs?	✔		
3. Based on current airport and operational data for the existing condition year NEM, and forecast data representative of the selected year for the forecast NEM?	✔		Chapter 1, Section 1.3.1.1, pages 1-2 to 1-4 Chapter 1, Section 1.3.1.2, pages 1-4 to 1-6 Chapter 2, pages 2-1 to 2-34

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES / REVIEW COMMENTS
E. Flight tracks for the existing condition and forecast year timeframes (these may be on supplemental graphics which must use the same land use base map and scale as the existing condition and forecast year NEM), which are numbered to correspond to accompanying narrative?	✔		Chapter 2, Exhibits 2.7-2 to 2.7-8, pages 2-23 to 2-29
F. Locations of any noise monitoring sites (these may be on supplemental graphics which must use the same land use base map and scale as the official NEMs).		✔	No noise monitoring sites at LIH
G. Noncompatible land use identification:			No noncompatible land uses within the DNL 65 dBA contours depicted on the map graphics; Exhibit NEM-1, page ii Exhibit NEM-2, page iii Chapter 3, Exhibit 3.1-1, page 3-2 Chapter 3, Exhibit 3.2-1, page 3-7
1. Are noncompatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?		✔	
2. Are noise sensitive public buildings and historic properties identified? (*Note: If none are within the depicted NEM noise contours, this should be stated in the accompanying narrative text.*)	✔		
3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	✔		
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?	✔		No compatible land uses normally considered noncompatible located within the DNL 65 dBA contours Chapter 1, pages 1-6 to 1-9 Chapter 2, pages 2-7 to 2-12
V. Narrative Support of Map Data: [150.21(a), A150.1, A150.101,A150.103]			
A. 1. Are the technical data and data sources on which the NEMs are based adequately described in the narrative?	✔		Chapter 2, pages 2-1 to 2-34 Appendix B
2. Are the underlying technical data and planning assumptions reasonable?	✔		Chapter 4, pages 4-1 to 4-2 Appendix B Appendix C Appendix D
B. Calculation of Noise Contours:			
1. Is the methodology indicated?	✔		Chapter 1, pages 1-2 to 1-6 Chapter 2, Section 2.7, pages 2-14 to 2-34
a. Is it FAA approved?	✔		Chapter 1, Section 1.3.1, pages 1-2 to 1-6 Appendix B
b. Was the same model used for both maps? (*Note: The same model also must be used for NCP submittals associated with NEM determinations already issued by FAA where the NCP is submitted later, unless the airport sponsor submits a combined NEM/NCP submittal as a replacement, in which case the model used must be the most recent versionat the time the update was started.*)	✔		Chapter 1, Section 1.3.1, page 1-2 Chapter 3, pages 3-1 to 3-9
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?		✔	FAA-approved model was used Chapter 1, Section 1.3.1, page 1-2 Chapter 2, pages 2-15 and 2-34
V. Narrative Support of Map Data: [150.21(a), A150.1, A150.101, A150.103]			
2. Correct use of noise models:			
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another that was not included on the FAA's pre-approved list of aircraft substitutions?		✔	No adjustments as noted in Chapter 2, page 2-15

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES / REVIEW COMMENTS
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	n/a	n/a	
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?	n/a		No noise monitoring at LIH
4. For noise contours below DNL 65 dB, does the supporting documentation include an explanation of local reasons? (Note: A narrative explanation, including evidence the local jurisdiction(s) have adopted a noise level less than DNL 65 dB as sensitive for the local community(ies), and including a Table or other depiction of the differences from the Federal table, is highly desirable but not specifically required by the rule. However, if the airport sponsor submits NCP measures within the locally significant noise contour, an explanation must be included if it wants the FAA to consider the measure(s) for approval for purposes of eligibility for Federal aid.)	✔		Chapter 1, pages 1-7 to 1-9
C. Noncompatible Land Use Information:			
1. Does the narrative (or map graphics) give estimates of the number of people residing in each of the contours (DNL 65, 70 and 75, at a minimum) for both the existing condition and forecast year maps?	✔		Chapter 3, Tables 3.1-2 and 3.2-2, pages 3-4 and 3-8
2. Does the documentation indicate whether the airport operator used Table 1 of Part 150?	✔		Chapter 1, page 1-6
a. If a local variation to Table 1 was used:			
(1) Does the narrative clearly indicate which adjustments were made and the local reasons for doing so?	✔		Chapter 1, pages 1-7 to 1-8
(2) Does the narrative include the airport operator's complete substitution for Table 1?	✔		Chapter 1, pages 1-7 to 1-9 Appendix A, Table A.2-3
3. Does the narrative include information on self- generated or ambient noise where compatible or noncompatible land use identifications consider non-airport and non-aircraft noise sources?	n/a	n/a	
4. Where normally noncompatible land uses are not depicted as such on the NEMs, does the narrative satisfactorily explain why, with reference to the specific geographic areas?	n/a	n/a	
5. Does the narrative describe how forecast aircraft operations, forecast airport layout changes, and forecast land use changes will affect forecast compatibility in the future?	✔		Chapter 2, pages 2-4 to 2-6 and 2-11
VI. Map Certifications: [150.21(b), 150.21(e)]			
A. Has the operator certified in writing that interested persons have been afforded adequate opportunity to submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts?			Sponsor’s Certification, Page i
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete under penalty of 18 U.S.C. § 1001?			Sponsor’s Certification, Page i

APPENDIX F

FAA Formal Review Comments and Responses

F.1 | DOT-A REPONSE TO FAA'S FORMAL REVIEW COMMENTS

F.2 | ATTACHMENT A – FAA'S REVIEW AND COMMENTS LETTER DATED SEPTEMBER 7, 2022

F.3 | ATTACHMENT B – PUBLIC COMMENT AND TECHNICAL ADVISORY COMMITTEE MEEETING SUMMARY NOTES

APPENDIX F.1

DOT-A REPONSE TO FAA'S FORMAL REVIEW COMMENTS

JOSH GREEN, M.D.
GOVERNOR

EDWIN H. SNIFFEN
DIRECTOR

Deputy Directors
DREANALEE K. KALILI
TAMMY L. LEE
ROBIN K. SHISHIDO
JAMES KUNANE TOKIOKA

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

AIR-EP 23.0010

February 2, 2023

Mr. Carlos H. Salas
Acting Airports District Office Manager
Federal Aviation Administration
P.O. Box 50244
Honolulu, Hawaii 96850

Dear Mr. Salas:

Subject: Amended Noise Exposure Map Update Submission Pursuant to Title 14 Code of Federal Regulations Part 150, Airport Noise Compatibility Planning, Lihue Airport, Kauai, Hawaii, State Project No. AK1012-10

The State of Hawaii, Department of Transportation, Airports Division (DOT-A) acknowledges receipt of the Federal Aviation Administration's (FAA) formal review comments on the Lihue Airport (LIH) Noise Exposure Map (NEM) Update Report, dated June 2022. For reference purposes, the FAA's review and comments letter, dated September 7, 2022, is included as Attachment A.

The following are DOTA's responses to FAA's comments in italics:

1. *Submit the public comments received during the public review and comment period through separate correspondence to the FAA for our files and include this submission information in the LIH NEM Update submittal.*

   The DOT-A received one written public comment on the Draft NEM Report on March 17, 2022 – after the comment period deadline of March 16, 2022. Section 4, page 4-1, of the NEM Report submitted to the FAA states "Public comments were considered when the Study was finalized. One written public comment was received (see Appendix D)." A copy of the written comment is provided in Appendix D.7. Attachment B of this letter provides a copy of the email comment. The DOT-A also consulted with the Technical Advisory Committee (TAC), which a copy of the meeting notes summarizing feedback provided by the TAC members is included in Attachment B.

2. *For the NEMs, we have carefully reviewed the aviation forecast information provided in Appendix B.2. of the June 16, 2022, LIH NEM Update submittal and request additional information be provided to the FAA about HDOT's selection of the year 2019 for the existing condition NEM. Specifically, describe why the year 2020 was not selected for the existing condition. We have reviewed the comparison between 2019 and 2020 operational number in Appendix B.2. However, we request you verify the number of noise sensitive land uses within the 65 decibel (dB) day-night average sound level (DNL) would be larger for the year 2019 compared to the year 2022 (the year of submission). Present information in the LIH NEM Update submittal verifying that the number of noise sensitive land uses within the 65 dB DNL contour eligible for sound mitigation would be greater using the year 2019 than 2022 due to the reduction in aircraft operations due to the COVID-19 Pandemic. Based on the information provided in Appendix B.2. in the June 16, 2022, formal submittal, describe how HDOT anticipates the number and type of aircraft operations would return to 2019 levels by the forecast year NEM of 2027.*

   The DOT-A selected 2019 for the base year NEM, because it was the last full year of operations data at the time the NEM update was being prepared pursuant to Title 14, Code of Federal Regulations (CFR) Part 150 (Part 150 NEM Update). As indicated in the FAA checklist for preparing Part 150 documentation, the airport sponsor should verify in writing, that operations data in the Part 150 documentation are representative of existing conditions. The summary below discusses the rationale for using 2019 to represent existing conditions and for the continued use of the Master Plan 2027 forecast detailed in Chapter 1 of the Part 150 NEM Update report (NEM Update report) submitted in June 2022.

   Describe why the year 2020 was not selected for the existing condition.
   As indicated in Section 1.3.1.1 in the Part 150 NEM Update report, the data collection and preliminary analysis for the Part 150 NEM Update were initiated in mid-2020, using operations data for calendar year 2019, the most recent complete calendar year at that time. The analysis to develop updated NEMs took just over two years to complete, due in part to the delays caused by the Master Plan forecast approval process and the 2020 COVID-19 pandemic. Section 1.3.1.1 of the NEM Update report describes two reasons 2019 is still considered a reasonable representation of existing conditions rather than 2021 or 2022: 1) the impact the 2020 COVID-19 pandemic had on operations, and 2) the significant year over year growth forecast for the recovery period. These reasons also hold true for 2020.

   Significant Decrease in Operations in 2020: The 2020 COVID-19 pandemic impacted the aviation industry and operations worldwide and, as noted above, impacted the Part 150 NEM Update project schedule. Operations at LIH decreased from 131,702 in

Fiscal Year (FY)[1] 2019 to 62,374 in FY 2020, a 53 percent decrease.[2] This decrease was caused by the 2020 COVID-19 pandemic restrictions and its direct and immediate impact on scheduled operations. As indicated in Section 1.3.1.1 of the NEM Update report, the impact caused by the 2020 COVID-19 pandemic restrictions is considered temporary. Operations data for 2020 represent a temporary condition subject to substantial year over year change until demand recovers. Therefore, 2020 does not reasonably represent existing conditions.

Post-2020 COVID-19 Pandemic Recovery to 2019 Levels between 2020 and 2024: Section 1.3.1.1 of the NEM Update report documents the significant growth FAA has forecast for the post-2020 COVID-19 pandemic recovery period. In the FAA 2021 TAF Executive Summary Report, FAA defines recovery as the point when an airport reaches pre-pandemic operation levels recorded for 2019.[3] The post-2020 COVID-19 pandemic growth in operations is forecast to occur at a higher rate than normal over the short-term as the aviation system recovers. The recovery growth rates forecast by FAA are greater than those experienced following other major disruption events, such as the September 11, 2001, terrorist attacks and Hurricane Iniki in September 1992. The 2020 FAA Terminal Area Forecast (TAF)[4] released in May 2021 indicated a 13 percent compound annual growth rate (CAGR)[5] between 2020 and 2025 at LIH. The 2021 TAF released by the FAA in March 2022 indicates similar high short-term growth rate at LIH as the aviation system recovers to 2019 levels by FY 2024. According to the FAA's 2021 TAF, operations are expected to recover at a rate of 25 percent from FY 2021 to FY 2022, 33 percent from FY 2022 to FY 2023, and another 24 percent from FY 2023 to FY 2024. Growth rates are forecast to reduce to about 1 percent per year after recovery from FY 2025 to FY 2045.

Use of operations data from 2000 would result in the need to update the NEMs once operations levels at LIH again reach 2019 levels. Therefore, 2019 represents an existing condition equivalent to post-2020 COVID-19 pandemic recovery conditions.

Verify that the number of noise sensitive land uses within the 65 dB DNL contour eligible for sound mitigation would be greater using the year 2019 than 2022 due to reduction in aircraft operations from COVID-19 pandemic.

The current Noise Compatibility Program (NCP) does not include an FAA-approved measure for a sound insulation program; therefore, the number of people or acreage of

[1] Fiscal year is the Federal Aviation Administration's fiscal year defined between October 1st to September 30. This is used to compare fiscal year forecast counts provided in FAA Terminal Area Forecast. The 2019 annual operations used for the NEM are based on calendar year operation counts.
[2] Federal Aviation Administration, Operations Network – Airport Operations Report, August 2022 (accessed on August 3, 2022)
[3] Federal Aviation Administration, 2021 Terminal Area Forecast Executive Summary Fiscal Years 2021 to 2045, June 2022, page 4.
[4] US Department of Transportation, Federal Aviation Administration, *2020 Terminal Area Forecast*, May 2021.
[5] The CAGR represents the annual growth rate experienced over a specified period of time.

noise-sensitive land use exposed to DNL 65 dBA or higher in 2019 versus 2022, which would be based on a full year of operations data collected for 2021, does not have an impact on eligibility for sound insulation treatment as a mitigation measure under the NCP for the LIH. Regarding noise contours and noise sensitive land uses, there are no people nor residential uses or other noise-sensitive structures located within the DNL 65 dBA and higher noise contour area for 2019. Based on the 35 percent decrease in operations in calendar year 2021 compared to calendar year 2019 as reported by FAA Operations Network (OPSNET) airport operations database, it can be reasonably concluded that the area within the DNL 65 and higher noise contour would be larger for 2019 compared to a contour based on 2021 operations data.

Describe how HDOT anticipates the number and type of aircraft operations would return to 2019 levels by the forecast year NEM of 2027

The DOT-A concurs with FAA's 2020 and 2021 TAF forecasts indicating recovery to 2019 operation levels is expected to occur prior to 2027. The FAA 2021 TAF indicates recovery in 2024. Growth rates after 2024 are expected to normalize and reach operation levels in 2027, similar to those forecast in DOT-A's Master Plan forecast. Table 1.3-1 in the NEM Update report shows the comparative results between the Master Plan forecast 2027 operation levels and FAA's 2020 TAF levels for 2027, with the difference being approximately five percent. In the 2021 TAF, 140,608 operations are forecast for 2027, within three percent of the Master Plan forecast. Based on the two FAA TAF comparisons, the 2027 operation levels modeled are well within the 10 percent margin identified in the FAA's forecast review guidance.[6] Therefore, DOT-A's forecast operations levels for 2027 remain valid for the Part 150 NEM Update.

The type and frequency of aircraft that contribute most to the overall DNL exposure levels at LIH in the Master Plan forecast for 2027 are not expected to change as a result of the 2020 COVID-19 pandemic. At the time of the formal NEM Update report submittal in June 2022, FAA's OPSNET airport operations count indicated monthly traffic began to increase compared to the same month of the previous year in June 2021,[7] three months after the COVID-19 vaccine was available to the public in the State of Hawaii.[8] Further, based on a review of the FAA's Traffic Flow Management System Counts database,[9] the primary aircraft used by airlines in 2019 and throughout the recovery period continue to be narrowbody jet aircraft, such as the Airbus 320, Airbus 321, Boeing 737, and Boeing 757. Smaller numbers of larger, widebody aircraft, such as the Boeing 767, operated in 2019 and throughout the pandemic. The primary corporate

6 Federal Aviation Administration, *Review and Approval of Aviation Forecasts*, June 2008.
7 Federal Aviation Administration, Operations Network – Airport Operations Report, November 2022 (accessed November 2, 2022).
8 State of Hawaii, Department of Health, *Vaccinations for Those 70 and Older Begin Monday, March 8*, March 3, 2021, https://health.hawaii.gov/news/newsroom/vaccinations-for-those-70-and-older-begin-monday-march-8/ (accessed November 2, 2022).
9 Federal Aviation Administration, *Traffic Flow Management System Counts*, January 2019 to September 2022, November 2022 (accessed November 2, 2022).

jet operating at LIH in 2019 and throughout the pandemic were the Gulfstream models, and the primary propeller aircraft continued to be the Cessna 208. These aircraft types have been, and are forecast to continue to be, the primary contributors to noise exposure at LIH.

Domestic operations are still recovering, however, aircraft types serving LIH appear to follow forecast trends indicated in the Master Plan forecast. Demand has shown a notable increase during the summer months of 2022 and airlines have the aircraft capacity, but staffing has limited their ability to meet demand because of early retirements and layoffs in response to the 2020 COVID-19 pandemic.[10] Airlines are using newer, fuel-efficient aircraft, such as the Boeing 737 MAX and Airbus 321-NEO, although not all older aircraft have been retired. It is difficult to determine how long high fuel prices will continue at their current levels but they are not expected to have a notable effect on the aircraft types forecast for 2027, as most types already forecast for 2027 are newer, fuel-efficient aircraft. It is reasonable to forecast that as airlines recover staffing, frequencies will increase further using existing aircraft. There is also no indication that new service using larger, widebody aircraft, such as the Boeing 787 and/or Airbus 330, would be delayed because of the post-2020 COVID-19 pandemic recovery. Therefore, the current forecast level of operations and fleet mix for 2027 continues to be a reasonable forecast.

3. *Include the approved final version of the "Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts" in the LIH NEM Update submittal. The version that was submitted to the FAA was a draft of the document dated March 2020.*

   The Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts Report in Appendix B.2 has been updated to remove the "draft" stamp.

4. *Depict the noncompatible land uses within the 65dB DNL contour graphically in the Existing Year (2019) NEM and Future Year (2027) NEM and include these descriptions within their respective NEM legends*.

   The Existing Year (2019) NEM and Future Year (2027) NEM exhibits have been amended to clearly identify the natural land and the golf course land use areas within the DNL 70 dBA contour, which are considered noncompatible land uses according to Table 1 in § A150.101. The certification statement was re-signed as a result of the amendment.

[10] Los Angeles Times, Why flights are so expensive right now., May 26, 2022.

5. *In addition, the FAA requests that the NEM Checklist that HDOT prepared and included within the LIH NEM Update submittal be taken out of the main body of the submittal and, instead, be included as a separate appendix. If HDOT wishes to maintain the location of the NEM Checklist within the body of the submittal, then the page numbering would need to be adjusted accordingly.*

   The NEM Checklist has been removed out of the main body of the submittal and included as Appendix E.

We look forward to receiving FAA's acceptance of the Amended Part 150 NEM Update Report and NEM maps. If you have any questions, please contact Mr. Herman Tuiolosega, Head Planner of the Airports Division, at (808) 838-8810 or via email at herman.tuiolosega@hawaii.gov.

Sincerely,

EDWIN H. SNIFFEN
Director of Transportation

Attachments: A – FAA's Review and Comments Letter, dated September 7, 2022
B – Public Comment and Technical Advisory Committee Meeting Summary Notes

c: Ms. Ura Yvan, Director, Ricondo & Associates, Inc.

APPENDIX F.2

ATTACHMENT A - FAA'S REVIEW AND COMMENTS LETTER DATED SEPTEMBER 7, 2022

U.S Department
of Transportation

Federal Aviation Administration

Western-Pacific Region
Airports District Office

300 Ala Moana Blvd, Room 7-128
Honolulu, HI 96813
MAIL: Box 50244
Honolulu, HI 96850-0001
Telephone: (808) 312-6028

September 7, 2022

Mr. Jade T. Butay
Director of Transportation
State of Hawaii Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Dear Mr. Butay:

Lihue Airport
Noise Exposure Maps Update

This letter is to advise you that the Federal Aviation Administration (FAA) has completed its preliminary review of the Lihue Airport (LIH) Noise Exposure Map (NEM) Updates submittal. The State of Hawaii, Department of Transportation (HDOT) submitted the 2019 and 2027 LIH NEMs to the FAA electronically in a letter to the FAA on June 16, 2022.

We require HDOT to provide the following additional information:

1. Submit the public comments received during the public review and comment period through separate correspondence to the FAA for our files and include this submission information in the LIH NEM Update submittal.

2. For the NEMs, we have carefully reviewed the aviation forecast information provided in Appendix B.2. of the June 16, 2022 LIH NEM Update submittal and request additional information be provided to the FAA about HDOT's selection of the year 2019 for the existing condition NEM. Specifically, describe why the year 2020 was not selected for the existing condition. We have reviewed the comparison between 2019 and 2020 operational number in Appendix B.2.. However, we request you verify the number of noise sensitive land uses within the 65 decibel (dB) day-night average sound level (DNL) would be larger for the year 2019 compared to the year 2022 (the year of submission). Present information in the LIH NEM Update submittal verifying that the number of noise sensitive land uses within the 65 dB DNL contour eligible for sound mitigation would be greater using the year 2019 than 2022 due to the reduction in aircraft operations due to the COVID-19 Pandemic. Based on the information provided in Appendix B.2. in the June 16, 2022 formal submittal, describe how HDOT anticipates the number and type of aircraft operations would return to 2019 levels by the forecast year NEM of 2027.

3. Include the approved final version of the “Master Plan and Noise Exposure Map Update – Aviation Activity Forecasts” in the LIH NEM Update submittal. The version that was submitted to the FAA was a draft of the document dated March 2020.

4. Depict the noncompatible land uses within the 65dB DNL contour graphically in the Existing Year (2019) NEM and Future Year (2027) NEM and include these desriptions within their respective NEM legends.

5. In addition, the FAA requests that the NEM Checklist that HDOT prepared and included within the LIH NEM Update submittal be taken out of the main body of the submittal and, instead, be included as a separate appendix. If HDOT wishes to maintain the location of the NEM Checklist within the body of the submittal, then the page numbering would need to be adjusted accordingly.

If you have any questions about the Part 150 process or other questions about this matter, please contact Mr. Kevin Nishimura by email at kevin.h.nishimura@faa.gov.

Sincerely,

Carlos H. Salas
Assistant Manager, Honolulu Airports District Office

cc: AWP-610

APPENDIX F.3

ATTACHMENT B – PUBLIC COMMENTS AND TECHNICAL ADVISORY COMMITTEE MEETING SUMMARY NOTES

From: LIH Master Plan <no-reply@wufoo.com>
Sent: Tuesday, May 17, 2022 8:09 AM
To: Severn, Raymond S <raymond.s.severn@hawaii.gov>
Cc: Ura Yvan <uyvan@ricondo.com>
Subject: [EXTERNAL] Question or Comment from Peter McClaran

Name *	Peter McClaran
Email *	petermcclaran@gmail.com
My Phone Number	(808) 397-9242
Topic of Your Message *	Noise Exposure Map Questions or Comments

Message

Hello, Regarding noise exposure, I want to inform you that my residence at the Lihue Townhouse Apts. at 4156 is presently significantly impacted by the noise of the big jets taking off from Lihue Airport. So, looking at your project to extend the airport and blast area 1,000 feet closer to this area I am concerned that the level of noise will increase substantially. As the bird flies the current blast zone is about 4,000 feet away. With the change in the runway the blast area will be moved to within 3,000 feet. That is 25% closer to this residential area therefore we will likely experience a 25% increase in the noise level at this residence. This kind of increase in noise for this residential area has not been addressed. I would recommend that this potential increase in noise for the Lihue residential area be addressed and mitigated. The EIS for this project does not include this residential area in its study but the impact is substantial. Looking forward to a response.

Lihue Noise Exposure Map Update

October 25, 2021

Technical Advisory Committee Meeting #1

2:00pm HST

Airport Project Number: AK1012-10

Zoom

MEETING FACILITATOR: Ura Yvan

NOTE TAKER(S): Monica Daga, Ryan Lenda

MEETING ATTENDEES	REPRESENTING	EMAIL
Roth Puahala	Hawaii State Senator Ronald D. Kouchi	r.puahala@capitol.hawaii.gov
Arryl Kaneshiro	County of Kauai	ajkaneshiro@kauai.gov
Don Kakuda	County of Kauai, Wastewater Division	dkakuda@kauai.gov
Kaaina Hull	County of Kauai, Planning Department	khull@kauai.gov
Lea Kaiaokamalie	County of Kauai, Planning Department	lkaiaokamalie@kauai.gov
Mark Perriello	Kauai Chamber of Commerce	mark@kauaichamber.org
Kimberly Evans	Federal Aviation Administration	Kimberly.Evans@faa.gov
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Tony Ind	FedEx	
Casey Riemer	Jack Harter Helicopters	criemer@jackharterheli.com
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Monica Daga	Ricondo	mdaga@ricondo.com
Ryan Lenda	Ricondo	rlenda@ricondo.com
Steve Smith	Ricondo	ssmith@ricondo.com
Ura Yvan	Ricondo	uyvan@ricondo.com

SUMMARY OF MEETING DISCUSSION

A presentation provided in **Attachment A** was given at the start of the meeting related to the Title 14 Code of Federal Regulations (CFR) Part 150 Noise Exposure Map (NEM) update study.

The following points were discussed:

- Welcome and Introductions Guy Ichinotsubo, Department of Transportation – Airports Division (DOT-A) Engineering Manager and Herman Tuiolosega, Head Planner (DOT-A)
- Roll call of online participants and Zoom Protocols by Ura Yvan, Consultant Team (Ricondo)
- Objective of the Technical Advisory Committee (TAC) Meeting #1 for the Noise exposure Map Update (NEM) by John Williams, Project Principal (Ricondo).
  - To review the Title 14 Code of Federal Regulations (CFR) Part 150 process.
  - Confirm with TAC the methodology/assumptions considered (i.e., aircraft noise, aircraft noise model flight tracks, forecast of operations, and land use data and compatibility guidelines.)
  - To obtain input and insight on technical issues associated with certain aspects of the aviation, airport operations, and land use from TAC members.
- Overview of the 14 CFR Part 150 by John Williams, Project Principal (Ricondo)
  - The history, components, process/schedule, regulatory framework of the 14 CFR Part 150 was explained.
  - This project will only update the NEMs and not the Noise Compatibility Program (NCP). The NEMs will identify and evaluate existing/ future aircraft noise and existing/future land use conditions in the vicinity of Lihue Airport (LIH) due to the changes of operations, aircraft, airfield, and incompatible land use since the FAA-accepted NEM.
- Understanding Noise and Sound Level Metrics by Stephen Smith, Subject Matter Expert (Ricondo)
  - The noise metric used to assess airport noise is day-night average sound level (DNL). DNL represents the cumulative effects of all aircraft operations occurring during an average 24-hour period and is expressed in A-weighted decibels (dBA).
  - Description of other noise metrics and relationship to the calculation of DNL included:
    - Sound Exposure Level (SEL)- Sound energy of a single noise event
    - Maximum Sound Level (Lmax) – Peak instantaneous sound level
    - Equivalent sound level (Leq) – Total sound level averaged over the duration of the event.
- Operations Forecast and Study Years by Stephen Smith, Subject Matter Expert (Ricondo)
  - The basis for the operations forecast was the LIH Master Plan Update – Aviation Activity Forecast analysis, which was approved by the FAA on September 30, 2020.
  - Uncertainties related to the severity and duration of the COVID-19 Pandemic was considered.
  - A comparison of the LIH Master Plan Update – Aviation Activity Forecast and the 2020 FAA Terminal Area Forecast (TAF) showed that the operations levels prior to the COVID-19 Pandemic (2019) would return in 2025 (a 13.3 percent compound annual growth rate) and the variance between the two forecasts is less than 10 percent after recovery to 2019 operation levels.

- Presented reasoning why the NEM Update utilizes 2019 as the existing base case condition and 2027 as the future base case condition.
- A summary of the annual aircraft itinerant and local operations by operator/user category (i.e., air carrier, air taxi, general aviation, and military was provided. (See tables in PowerPoint Presentation in Attachment A).
  - TAC Member Comments:
    - It was agreed by Casey Riemer, Manager (Jack Harter Helicopters) that the majority of the operations are helicopters.
    - Kimberly Evans, Community Planner (FAA) shared that FAA Environmental Protection Specialists, Dave Kessler and Kevin Nishimura, will review and provide comments regarding the proposed study years and application of the Master Plan forecast.

- Noise Modeling Methodology and Inputs by Stephen Smith, Subject Matter Expert (Ricondo)
  - The Aviation Environmental Design Tool (AEDT) Version 3d is the noise model being used for the 14 CFR Part 150 NEM Update.
  - Aircraft noise modeling allows calculation and illustration of aircraft noise exposure (via noise contours); evaluation of changes in noise impacts due to changes in runway use, runway configuration, aircraft fleet mix, and number of operations; and assessment of operational procedures.
  - The noise model inputs include operation levels, aircraft fleet mix, time of day distribution, aircraft performance characteristics, runway use, and flight track locations/use.
    - The following average annual operations (itinerant and local) during the time of day was reviewed:
      - Itinerant Operations
        - The average annual itinerant operations time of day distribution is the same for existing and future conditions: 88 percent during the day and 12 percent at night.
        - The majority of the existing average annual itinerant operations during the day is by helicopters which will continue in the 2027 future base case condition.
        - The night average annual itinerant operations are currently driven by the large and small jets and will continue in the 2027 future base case condition.
      - Local Operations
        - The average annual local operations time of day distribution is the same for existing and future conditions: 81 percent during the day and 19 percent at night.
        - The existing local annual itinerant operations during the day is driven by helicopters and then piston/turboprop aircraft. This will continue in the 2027 future base case condition.
        - The night average annual itinerant operations are currently driven by piston/turboprop aircraft and will continue in the 2027 future base case condition.
      - TAC Member Comments: Casey Riemer confirmed helicopter operation counts.
    - The commercial aircraft stage length (the departure flight distance from the airport to a destination) distribution is primarily Stage 1 and Stage 4.

- Runway/Helipad Use
  - Itinerant operations primarily utilize Runway 35 for arrivals and Runway 3 for departures.
  - Local operations primarily utilize Runway 3-21.
  - The three helipads (northeast of the passenger terminal) were modeled as one helipad due to its close proximity to each other.
- Flight track exhibits of fixed-wing, military, and helicopters were shown.
  - TAC Member Comments:
    - It was noted by Casey Riemer that the generalized fixed-wing flight track for arrivals to Runway 3 does not include fixed-wing propeller approach tracks that enter the left and right base to the final approach to Runway 3. The flight that enter the left base turn are air tour operators and those that enter the right base turn are coming from other islands. The right base fixed-wing arrivals makes more of a sharp right base turn similar to the Runway 21 departures and closer to the west end of the Nawiliwili Bay point. The fixed-wing departures come closer to the northern point. Ricondo noted they will follow up with the air traffic control tower (ATCT).
    - Casey Riemer affirms the helicopter flight tracks are accurate.

- Land Use Compatibility by Stephen Smith, Subject Matter Expert (Ricondo)
  - — To understand the relationship between land uses and noise exposure associated with arriving and departing flights at an airport, 14 CFR Part 150 requires that land uses in an airport environs be reviewed.
  - — Guidelines regarding the compatibility of land uses within various DNL contour intervals are specified in Appendix A of 14 CFR Part 150 called "Table 1 - Land Use Compatibility* With Yearly Day-Night Average Sound Level".
  - — The FAA has determined that the major land uses listed in the table are normally compatible with aircraft noise less than DNL 65 dBA. Therefore, when evaluating land use compatibility, attention is focused on uses exposed to DNL 65 dBA and higher.
  - — Noise sensitive land uses initially considered as incompatible, can be compatible if noise attenuation is designed into the building's structure to meet the noise level reductions (NLR). These noise sensitive land uses include residential, mobile home parks, transient lodging, schools, outdoor music venues, hospitals, nursing homes, churches, auditoriums, and concert halls.
  - — The DOT-A established more stringent local land use compatibility guidelines due to the outdoor lifestyle of the people and that majority of Hawaii residences are naturally ventilated. These local guidelines consider land uses below DNL 60 dBA as compatible and utilizes the DNL 55 dbA for the required buyer notification boundary.
  - — The existing land use and zoning maps were presented and Stephen Smith asked TAC members familiar with land use and zoning if there are any future developments that would change land use/zoning and should be shown on a future land use map.
    - TAC Member Comments:

  - Casey Riemer noted there is an effort to change some of the zoning within the golf course area.
  - Herman Tuiolosega, Head Planner (DOT-A) affirmed that the proposed resort/residences within the golf course is an issue and raised the concern to County of Kauai officials.

- Public Involvement Plan by John Williams, Project Principal (Ricondo)
  - TAC members are invited to the Public Information Meeting #1 on October 26, 2021 and encouraged to visit the www.lihmasterplan.com website for updates and provide additional comments.
- Questions
  - Ricondo opened the lines for additional comments or questions from TAC members. There were no additional comments or questions.
  - Ricondo requested from Amy St. Pierre, Manager (Lihue Federal Contract Tower) for input on flight tracks presented. Amy noted that Rod Kitchel, Air Traffic Manager will address any questions.

ATTACHMENTS:

A - TAC Meeting #1 PowerPoint Presentation

DISTRIBUTION:

Meeting Attendees

document2

Lihue Noise Exposure Map Update

May 4, 2022

Technical Advisory Committee Meeting #2

2:00pm HST

Airport Project Number: AK1012-10

Zoom

MEETING FACILITATOR: Ura Yvan, Stephen Smith

NOTE TAKER(S): Monica Daga, Foo Pham

MEETING ATTENDEES	REPRESENTING	EMAIL
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Ura Yvan	Ricondo	uyvan@ricondo.com

SUMMARY OF MEETING DISCUSSION

The following points were discussed:

- Roll call of online participants and Zoom Protocols by Ura Yvan, Consultant Team (Ricondo)
- Welcome and Introductions Herman Tuiolosega, Head Planner, Department of Transportation – Airports Division (DOT-A)
- Zoom Protocols by Ura Yvan (Ricondo)
- Title 14 Code of Federal Regulations (CFR) Part 150 NEM Update Status by Stephen Smith (Ricondo)
    - It was noted that this project is only updating the Noise Exposure Map (NEM) and not the Noise Compatibility Program (NCP).

- An NEM Update is being conducted because of the changes in operations, aircraft used by operators, airfield configuration, and incompatible land use since the previous FAA-accepted NEM in 1990.
- The NEM analysis has been conducted and the results are documented in Draft NEM Report which is now available for comment. The Draft NEM Report was posted on the project website on April 17, 2022.
- The comment received during the TAC Meeting #1 regarding the fixed wing arrival noise model track to Runway 3 was reiterated.

- Land Use Compatibility by Stephen Smith (Ricondo)
  - Table summaries of the FAA's Land Use Compatibility and State of Hawaii Land Use Compatibility and the differences between the two were shown. The State of Hawaii developed its own Land Use Compatibility guidelines due to the outdoor life-style and the majority of the residences are natural ventilated.
- Noise Analysis Results by Stephen Smith (Ricondo)
  - The 2019 NEM incompatibility uses identified by the FAA guidelines were the golf course and natural land areas. In addition to these, the State of Hawaii guidelines included the resort and a place of worship as incompatible.
  - The 2027 NEM incompatibility uses identified by the FAA guidelines were the golf course and natural land areas. In addition to these, the State of Hawaii guidelines included a few residences, a place of worship, and resort as incompatible.
  - A table summary of the five historic properties located in the DNL 60+ dBA noise contour was shown.
  - Supplemental Information from the State of Hawaii Land Use Compatibility Guidelines were provided.
    - The DNL 55 dBA contour shown is for informational purposes only and is utilized by the State of Hawaii as a property buyer notification boundary.
    - All uses between the DNL 55 and 60 dBA noise contours are considered compatible by the FAA and State of Hawaii guidelines.
- Next Steps by Stephen Smith (Ricondo)
  - A public workshop will be conducted the next day, May 5, 2022.
  - The comment period for the Draft NEM Update Report is until May 16, 2022. Once comments have been reviewed the Draft NEM Update Report will be finalized and submitted to FAA for review and acceptance.
- Questions/Comments
  - Ricondo opened the lines for additional comments or questions from TAC members. The following summarizes the questions and comments received.

Q: [Representative James Tokioka, District 15] - Kauai Lagoons is now Timbers Resort and The Marriott is now Royal Sonesta.

A: Noted.

Q: [Representative James Tokioka, District 15] - Heard the FAA is changing the helicopter path to go over the residential area and fly 1,500 feet. Can FAA or DOTA Kauai Districts provide any information?

A: FAA, DOT-A, and DOTA Kauai Districts not aware of any change of flight paths.

ATTACHMENTS:

A - TAC Meeting #2 PowerPoint Presentation

DISTRIBUTION:

Meeting Attendees